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JUNE 6, 1940

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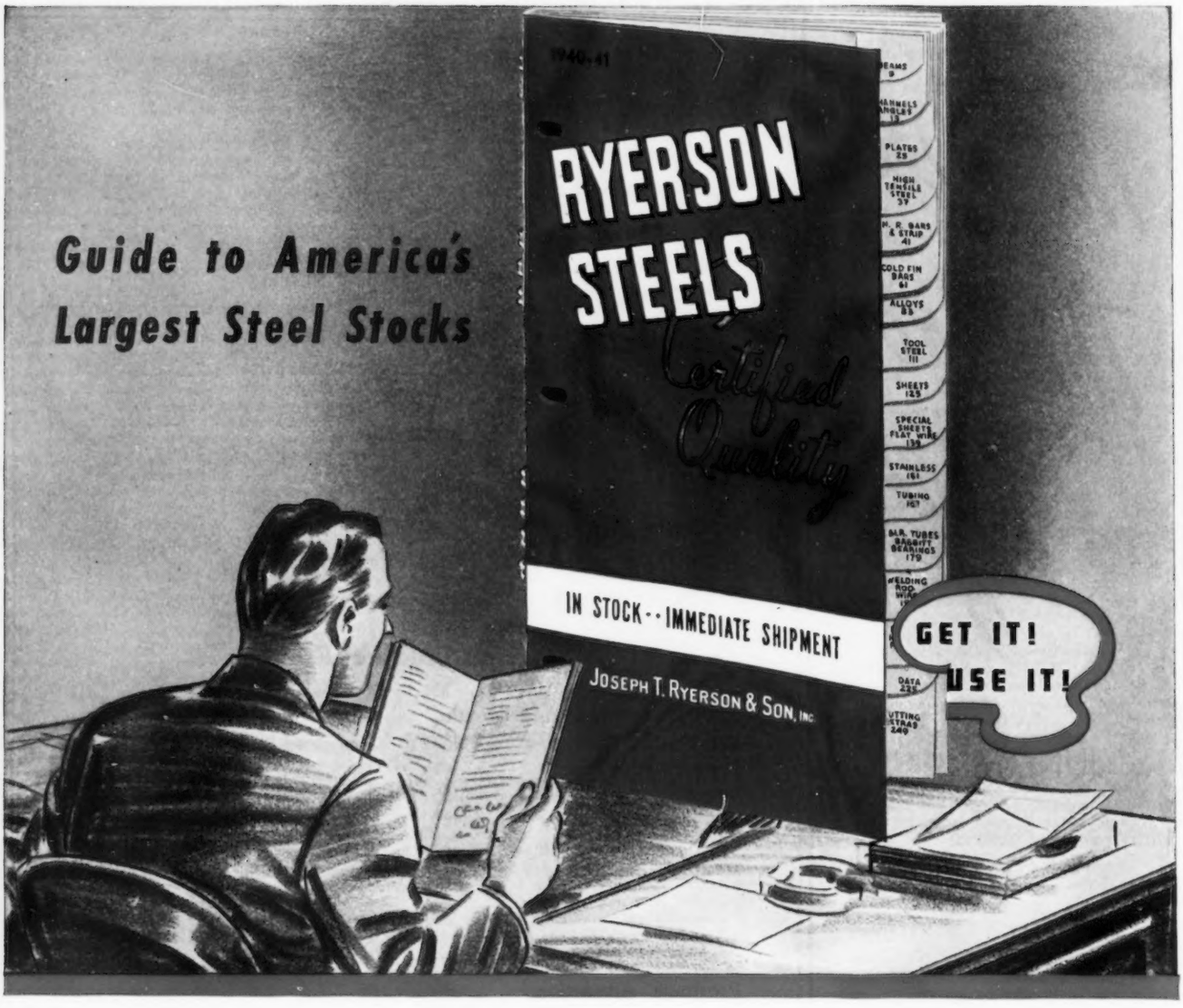

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In addition to an enlarged product index, the new book has an improved thumb tab margin index. Eye-conditioned paper assures easy reading. A new type of mechanical binding has been adopted so the book will lie flat and pages turn easily.

The Iron Age

JUNE 6, 1940

ESTABLISHED 1855

Fifth Columns

PRESIDENT ROOSEVELT, in his "fireside" chat of last week, neatly put all of his New Deal Critics into the "fifth column" together with all non-New Deal Democrats. Which brings up the question as to what a fifth column is and does.

The name was coined during the late civil war in Spain. Nationalist General Mola was advancing upon Madrid and was asked as to the strength of his attacking force. "I have four columns on the march outside the city," said he, "and one column inside of it that will act when the time comes."

From then on, the term "fifth column" seemed one that was made to order to describe the effective German policy of planting saboteurs in neighboring countries to be ready to act when the time came.

No doubt the sabotage of these enemy sojourners played considerable part in overcoming the resistance of the English and the French and in allowing such unprecedented German successes in taking planned objectives. But there was another kind of sabotage at work that was tremendously more damaging.

Sabotage can be deliberate and intentional or unintentional. It can be imported or domestic. And it is equally damaging whatever label you give it.

The weakness of France and England, in contrast to the strength of Germany, is primarily due to unintentional domestic sabotage. To the lack of the right men in the right places. To lack of organization for preparedness and a lack of the kind of men who were capable of visualizing what was needed and of putting it in effect.

What was needed to be visualized several years ago was that Germany was organizing its industries for a highly mechanized war. That Germany in doing this was putting men in charge of its armament program who through experience and force of character were capable of producing the goods at the time they would be needed.

The young soldiers of England and France who are now dying in the Belgian "pocket" are not paying with their lives because of a German "fifth column." They are paying the price of benevolent but ineffective political administrations in recent years in their home countries.

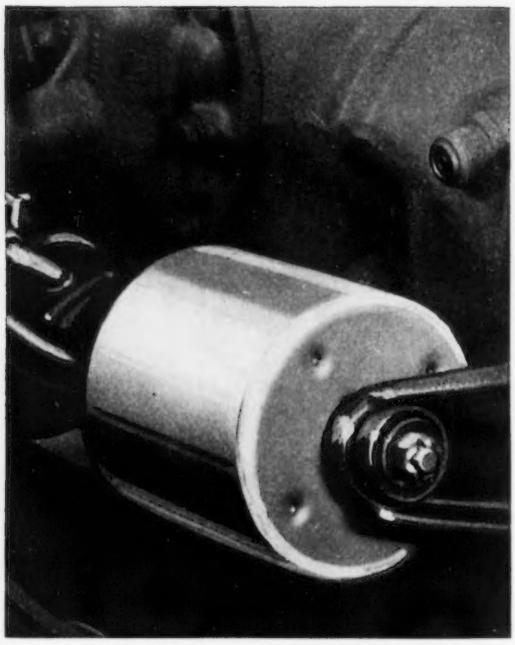
That should indeed be a lesson for us. Our great need is for top authority in the hands of people capable of quick and right decisions and no strings attached.

The four industrial members of the Advisory National Defense Commission, Knudsen, Stettinius, Hillman and Budd, are of first rate caliber. We are not qualified to express an opinion as to the others. But we have had advisory commissions and committees galore of first rate caliber during the past several years and their advice has gone out the window.

If that should happen now, Hitler will not need a "fifth column" in America.

J. H. Van Deventer

REJECTIONS CUT 2/3 on difficult draw!



Production cost went down when Inland Hot Rolled Sheets were used to form this vacuum cylinder.

Heart of the newest Automatic Gear Shift is this vacuum cylinder, a 4-inch diameter cup, drawn to a 4½-inch depth. And the call is for 8000 parts per day.

Ordinary sheets caused tremendously high breakage rates. An acceptable rejection figure was fixed at three per cent. When Inland Hot Rolled Sheets were used, the breakage was brought down to an average of less than one per cent!

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HARDNESS CONVERSION for HARD METALS

By T. H. GRAY and
HOWARD SCOTT
Westinghouse Electric & Mfg. Co.

THE hardness conversion charts presented here differ from their predecessors notably in the absence of the warning, "approximate only." Deletion of this customary phrase is justified by the substitution of more specific limitations on the use of the data and by giving more detailed information on the source of data than heretofore. This action was taken only after a thorough study of hardness tests, seeking fundamental objections to the use of conversion relations.

Comparing Rockwell and diamond pyramid hardness values obtained on hardened steels and on cemented carbides, consistent relations were obtained on each material, but the numerical values at the same hardness by one test were widely different by the other test. This fact was attributed to the large difference in elastic modulus between these metals and shown to be a natural consequence of the method of evaluating impression area used in the two tests (A. S. M. paper, Chicago, 1939), there being a much larger elastic "spring back" effect in tests measuring depth of impression than in those measuring diameter.

Finding that the elastic modulus has a prominent effect on conversion relations means, of course, that conversion charts for the different types of tests mentioned can be accurate only when restricted to metals of approximately the same elastic modulus. Accordingly this restriction here replaces the less specific one previously used "approximate only." Other properties than elastic modulus and composition can vary enormously without changing the conversion relations materially.

Other justifications for publishing new tables may be mentioned as follow. All hardness tests were referred to the same reference test having a long range of high accuracy, namely the diamond pyramid hardness test. Hardness values by other tests were made when possible by the maker of the instrument in question. The hardness by the Brinell ball used is specified to eliminate a common cause of discrepancy in hardness conversion tables. Finally, the tabular values are calculated from empirical equations which express accurately the observational data, the spacing between rows representing the same hardness interval on the reference scale at high as at low hardness.

HERE are hardness conversion equations and charts which on application do not have to be modified by assumption that they are only approximations. The data shown apply to steel and cemented carbides, and can be used quickly and with confidence.

The equations used to obtain the tabulated values for steel follow. The symbols appearing there are also defined, excepting DPH which stands for diamond pyramid hardness as measured on the latest model Vickers hardness testing machine.

R_c = Rockwell "C" scale hardness measured with 150 kg. load on the diamond brale.

$$= 119.0 - \sqrt{\frac{2.430 \times 10^6}{DPH}}$$ over range of 240 to 1040 DPH.

R_A = Same as R_c except 60 kg. load.

$$= 112.3 - \sqrt{\frac{6.85 \times 10^5}{DPH}}$$ over range of 240 to 1040DPH.

TABLE I—HARDNESS CONVERSION CHART FOR HARDENED STEELS

Diamond Pyramid Hardness, 50 Kg. Load	Rockwell Hardness					Scleroscope Hardness	Monotron Load Scale Value (9 Divisions)
	C Scale, 150 Kg., Brale Penetrator	A Scale, 60 Kg., Brale Penetrator	Superficial (Wilson Chart No. 38)				
			15-N Scale	30-N Scale	45-N Scale		
DPH	R_c	R_A	15-N	30-N	45-N	Scl.	Mon.
1040	70.7	86.7	94.8	87.0	78.7	102.7	117.3
1020	70.2	86.4	94.6	86.5	78.1	101.6	115.3
1000	69.7	86.2	94.4	86.0	77.5	100 4	113.0
980	69.2	85.9	94.2	85.5	77.0	99.3	110.9
960	68.7	85.7	93.9	85.0	76.3	98.1	108.7
940	68.1	85.3	93.6	84.5	75.6	97.0	106.6
920	67.6	85.1	93.4	84.0	75.0	95.8	104.5
900	67.1	84.9	93.1	83.5	74.5	94.6	102.4
880	66.5	84.5	92.8	83.0	73.8	93.4	100.2
860	65.9	84.2	92.6	82.5	73.0	92.1	98.0
840	65.3	83.8	92.3	82.0	72.4	90.8	95.9
820	64.6	83.5	92.0	81.5	71.7	89.5	93.8
800	63.9	83.2	91.7	81.0	71.0	88.2	91.6
780	63.2	82.8	91.4	80.5	70.2	86.9	89.5
760	62.4	82.4	91.0	79.8	69.3	85.6	87.4
740	61.6	81.9	90.7	79.0	68.5	84.2	85.2
720	60.8	81.5	90.2	78.5	67.5	82.8	83.1
700	60.0	81.0	89.9	77.8	66.5	81.4	81.0
680	59.2	80.6	89.5	77.0	65.5	80.0	78.8
660	58.3	80.1	89.0	76.3	64.5	78.5	76.7
640	57.4	79.6	88.6	75.5	63.5	77.0	74.5
620	56.4	79.1	88.2	74.5	62.3	75.5	72.4
600	55.3	78.6	87.7	73.7	61.2	74.0	70.2
580	54.2	78.0	87.2	72.8	60.0	72.4	68.1
560	53.1	77.4	86.6	71.5	58.7	70.8	66.0
540	51.9	76.7	86.0	70.5	57.2	69.2	63.9
520	50.6	76.1	85.4	69.5	55.7	67.5	61.7
500	49.2	75.4	84.7	68.3	54.2	65.8	59.5
480	47.8	74.6	84.0	67.0	52.6	64.0	57.4
460	46.3	73.8	83.2	65.5	51.0	62.1	55.2
440	44.7	72.9	82.5	64.2	49.2	60.2	53.1
420	42.9	72.0	81.6	62.5	47.3	58.3	51.0
400	41.0	71.0	80.7	61.0	45.0	56.3	48.8
380	39.0	70.0	79.6	59.0	43.0	54.2	46.7
360	36.8	68.8	78.6	57.0	40.3	52.0	44.6
340	34.4	67.4	77.4	55.0	37.5	49.8	42.4
320	31.8	66.0	76.2	53.0	34.5	47.4	40.2
300	29.0	64.6	75.0	50.3	31.3	45.0	38.1
280	26.0	62.9	73.3	47.5	27.5	42.3	36.0
260	22.7	61.1	71.6	44.5	24.0	39.5	33.8
240	19.1	59.0	69.8	41.5	20.0	36.5	31.7
220	.....	.....	.....	.....	.....	33.2	29.5
200	.....	.....	.....	.....	.....	29.7	27.3

Minimum thickness in inches of stock required for accurate readings by tests noted
(Values given are ten times depth of impressions)

Hardness of Stock, DPH	DPH Test		Rockwell Brale Test		Rockwell Superficial		BHN, 10 mm. Ball, 3000 Kg.
	10 Kg.	50 Kg.	R_c 150 Kg.	R_A 60 Kg.	15-N 15 Kg.	45-N 45 Kg.	
1000	0.0076	0.017	0.025	0.013	0.003	0.011	.....
900	0.0081	0.018	0.027	0.014	0.003	0.012	0.046
800	0.0086	0.019	0.030	0.015	0.004	0.014	0.052
700	0.0092	0.020	0.033	0.017	0.005	0.016	0.060
600	0.0100	0.022	0.038	0.020	0.006	0.019	0.071
500	0.0110	0.024	0.044	0.023	0.007	0.022	0.085
400	0.0120	0.027	0.050	0.027	0.009	0.026	0.102
300	0.0140	0.031	0.059	0.033	0.012	0.032	0.134
200	0.0170	0.038	0.072	0.041	0.015	0.040	0.197

Monotron tests at all hardnesses can be made on 0.018-in. stock or over. Scleroscope numbers vary with size—relations given are for 1 in. pieces.

Brinell Hardness
10 mm. Ball, 3000-Kg. Load

Tungsten Carbide Ball		Hultgren Ball, DPH-970		Standard Ball, DPH-930		Tensile Strength of Steel, $\times 10^3$
Hardness No., BHN	Diam., in mm.	Hardness No., BHN	Diam., in mm.	Hardness No., BHN	Diam., in mm.	
767	2.22					
757	2.23					
746	2.24					
735	2.26					
723	2.28					
710	2.30					
698	2.32					
685	2.34					
671	2.36					
656	2.39					
640	2.43	601	2.50	581	2.55	
621	2.46	586	2.53	571	2 57	326
602	2.49	578	2.55	560	2.59	316
584	2.53	565	2.58	549	2.615	306
565	2.57	552	2.60	537	2.645	296
546	2.62	537	2.64	525	2.67	279
527	2.66	521	2.68	510	2.71	269
508	2.72	506	2.73	496	2.75	260
489	2.77	489	2.77	481	2.79	250
471	2.81	473	2.81	465	2.84	240
452	2.87	454	2.87	448	2.89	230
433	2.94	437	2.92	432	2.94	220
414	3.00	418	2.99	415	3.00	210
395	3.07	399	3.05	398	3.06	200
377	3.14	380	3.13	380	3.13	190
358	3.22	361	3.21	361	3.21	180
339	3.31	342	3.30	342	3.30	170
320	3.40	323	3.39	323	3.39	161
301	3.50	304	3.48	304	3.48	151
283	3.60	285	3.59	285	3.59	141
264	3.74	266	3.72	266	3.72	131
245	3.87	247	3.85	247	3.85	121
226	4.03	228	4.01	228	4.01	111
207	4.20	209	4.18	209	4.18	101
189	4.38	190	4.37	190	4.37	91

R_{15-N} = Rockwell superficial hardness 15 kg. load, N brale.

$$= 117.94 - \sqrt{\frac{5.53 \times 10^5}{DPH}}$$ over range of 240 to 1040 DPH.

R_{30-N} = Same as 15-N except 30 kg. load.

$$= 129.52 - \sqrt{\frac{1.88 \times 10^6}{DPH}}$$ over range of 240 to 1040 DPH.

R_{45-N} = Same as 15-N except 45 kg. load.

$$= 133.51 - \sqrt{\frac{3.132 \times 10^6}{DPH}}$$ over range of 240 to 1040 DPH.

BHN = Brinell hardness number for 10-mm. ball with 3000 kg. load.
= 0.951 (DPH) for standard steel ball over range of 200 to 400 DPH.
= 0.951 (DPH) for Hultgren steel ball range of 200 to 450 DPH.
= 0.941 (DPH) for tungsten carbide ball over range of 200 to 700 DPH.

TS = Tensile strength as determined on 0.505 in. standard test specimen of ductile steel.
= 494 (DPH) − 7000 over range 200 to 660 DPH.

P = Monotron load scale value for penetration of 9 units.
= 0.107 (DPH) + 6 over the range of 200 to 1040 DPH.

Scl = Scleroscope hardness as determined with recording instrument on 1-in. square specimens.
= $\sqrt{11.52\ (DPH) - 1440}$ over the range of 200 to 1040 DPH.

Table I gives the values for the several tests calculated by these equations for 20 point steps in DPH. Values beyond the range of accuracy of these equations are taken directly from plotted curves. Also given are minimum values of stock thickness on which reliable hardness readings can be taken, upper right corner of Table I. A common cause of inaccurate readings is insufficient thickness of stock for the test used.

The only other material than steel of extremely high hardness whose hardness is frequently determined is the sintered carbides, mostly tungsten carbides. Having the extremely high elastic modulus of 79,000,000 per sq. in., this metal requires a different conversion relation from steel. A set of carbide specimens having a wide range of hardness was obtained through the courtesy of M. F. Judkins of the Firth Sterling Steel Co. The relations between two Rockwell scale readings and DPH were determined with these specimens and yielded the following equations:

R_c = Rockwell "C" scale hardness measured with 150 kg. load on the diamond brale.

$$= 117.35 - \sqrt{\frac{2.430 \times 10^6}{DPH}}$$ over the range of 900 to 1800 DPH.

TABLE II

Hardness Conversion Values for Sintered Carbides

Diamond Pyramid Hardness, 50-Kg. Load	Rockwell C-Scale, 150-Kg. Load Brale Penetrator	Rockwell A-Scale, 60-Kg. Load, Brale Penetrator
DPH	R_c	R_a
1750	80.1	92.2
1700	79.5	91.9
1650	79.0	91.6
1600	78.5	91.3
1550	77.7	91.0
1500	77.1	90.6
1450	76.5	89.9
1400	75.8	89.4
1350	75.0	89.4
1300	74.2	89.0
1250	73.3	88.6
1200	72.4	88.1
1150	71.5	87.6
1100	70.4	87.0
1050	69.3	86.4
1000	68.1	85.8
950	66.8	85.2
900	65.5	84.3

R_A = Same as R_c except 60 kg. load.

$$= \frac{211 - \sqrt{\frac{2.430 \times 10^6}{DPH}}}{1.885}$$ over the range of 900 to 1800 DPH.

Values of R_c and R_A on bonded carbides for 50-point steps in DPH between 900 and 1750 are given in Table II. The R_A test (60 kg. load) is quite popular in testing this material because of the lessened possibility of cracking the diamond indenter. Note that the R_c value on carbides at 900 DPH is 1.6 points lower than on steel at the same DPH.

A value obtained by conversion can be no better than the direct observation, so accurate conversion data are of no value unless the original observation is accurate. Accordingly, it is desirable to mention the more common causes of inaccuracy or inconsistency, namely:

(1) Failure to check testing instrument frequently.

(2) Carburized or decarburized skin.

(3) Depression in anvil with depth measuring test when testing thin material.

(4) Test impressions too close (the separation should be at least five times the impression diameter).

In spite of all these precautions, inconsistent conversion relations are still possible in one particular case, namely shallow hardened steel, although the depth of uniform hardening is deeper than specified for accuracy in Table I. Under this condition the observed Rockwell "C" hardness at a given DPH value may be as much as two points higher than that obtained by conversion from DPH. This effect is attributed to the high residual stress known to exist in shallow hardened steels when the hardness has not been reduced greatly by tempering.

DEEP DRAWING TESTS

BY PROF. H. S. SWIFT - M.A., D.Sc.

THERE is at the present time no generally accepted form of test for the deep-drawing qualities of sheet metal. Various forms of test have been proposed from time to time; each has had its champions and its critics, and there is sufficient evidence to show that each is satisfactory under certain conditions and unsatisfactory under others.

In approaching the problem of selecting a test procedure for deep-drawing sheet it is necessary to examine the conditions involved in the drawing operation and to ascertain the simplest combination of properties amenable to test which these conditions bring into play.

In general three different types of strain are involved in a deep-drawing operation.

The three types of action—bending, stretching, and drawing, occur together in most types of press operation, but in varying degree. Of the three, bending appears to present little difficulty in practice, though it is the subject of a non-standardized standard test. Stretching may occur without drawing in certain shallow pressing operations, but drawing does not occur without stretching under any normal conditions, and when material fails during pressing it almost invariably fails in a region subject to stretching as distinct from drawing.

Cupping Tests

This fact has naturally led to the conception that the most suitable material for drawing purposes is one which can be subjected to most stretching without fracture. This has led in turn to the use as a criterion of drawing quality, of either the elongation measured in a tensile test or the depth of penetration in a cupping test. As rough indications, capable of distinguishing between good and bad material, these tests have served a useful purpose, but they are very much under a cloud where close comparisons are required between materials just suitable and just unsuitable for an exacting operation.

This failure on the part of the cupping tests in particular is unfortunate, for they have several attractive features. They are simple and inexpensive to carry out, they are intrinsically multi-directional, and therefore bring into evidence any directionality in the material, they afford an indication of grain size and surface appearance, and they lend themselves to autographic load-penetration records with (hitherto undeveloped) possibilities of detailed interpretation.

In defence of the cupping test it should be pointed out that there is no intrinsic disability in the test itself, and provided a form is chosen which eliminates parasitic influences it has been demonstrated to provide a reliable and sensitive measure of that particular type of ductility which is required in stretching operations. Indeed, it is so closely simulative of such operations that failure to correspond with practical pressing results of a purely stretching character can only logically be attributed to want of consistency in the impressed conditions.

The Drawing Test

The cylindrical cup-drawing test has several attractive features, including almost all those associated with the cupping test. It is so closely simulative of many common forms of pressing that its acceptability as a criterion of the suitability of material for such pressings can almost be postulated. There is little scope for personal errors on the part of the observer, and the completed cup forms its own permanent record of the result of the test. The test is capable of providing a considerable amount of information apart from the primary dimensions; it is readily adaptable to autographic recording; it reveals any directional properties of the material by the formation of ears, it can be made to give an indication of grain size and surface finish under both stretching and drawing action, and it provides means for measurement of the tendency of the material to change thickness under drawing action.

Before such a test can be accepted with confidence: (1) It must be proved sufficiently consistent under fixed conditions to provide a sensitive means of differentiating between different materials.

(2) It must not be sensitive to such changes in testing conditions as are inevitable in practice.

(3) Conditions introduced by the exigencies of practical testing which bring into play other properties than those under direct consideration, such, for example, as local ironing, bending action over the die radius and surface condition as affecting friction, must

for SHEET METAL...

A CRITICAL and highly appreciative audience assembled in Birmingham (England) several months ago for the deep-drawing symposium organized by the Institution of Automotive Engineers. This paper was the high spot of the meeting, and at least in England the data presented by Professor Swift will likely be accepted as the standard work on deep drawing for some considerable time. In the extended abstract herein, from *Sheet Metal Industries*, it is particularly interesting to note the conclusion that maximum blank diameter which can be drawn successfully is a sensitive and consistent function of the drawing qualities of a metal. Also of great value are the data on lubrication.

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have no appreciable effect on the results.

In order to ascertain to what extent the intrinsic virtues of this drawing test can be preserved in practice, what precautions are necessary to ensure reliable results and what testing conditions and details of punch and die design are most satisfactory, it is necessary to have a fairly complete knowledge of the mechanism of the drawing process and of the influence of various details in design and procedure.

Experimental work described in this paper was undertaken primarily with the purpose of determining the suitability of the cylindrical cup pressing as a drawing test and of ascertaining proper conditions of test, but the investigation naturally touched on certain matters of a more general nature affecting the mechanism of the deep-drawing process, and in this connection results of significance are included.

In designing apparatus to produce cylindrical cups experimentally it was thought well that the apparatus should be sufficiently large to enable reliable measurements to be made of displacements or distortion and to eliminate the effect of minute inequalities, but small enough to be inserted in an ordinary testing machine and to avoid unnecessary waste of material in testing. It was thought desirable for experimental purposes that the apparatus should be capable of wide variations in the speed of operation, that it should give an autographic record of punch loads, and should enable the drawing process to be interrupted, as required, to examine partial pressings. It was also necessary to ensure accurate reproduction of the conditions of test, and to incorporate means for the ready adjustment of clearances to accommodate blanks of different thickness.

Autographic Sub-Press

The autographic sub-press shown in Fig. 1 was designed and constructed with these features in mind, to produce a cylindrical cup 2 in. in internal diameter from a flat circular blank.

For this purpose a punch of case-hardened steel was provided, having a diameter of 2.000 in. and (normally) a flat working end with a radius of ¼ in. round the edge. This plunger slides freely in the vertical direction in a cylindrical guide formed by the cast-iron cover of the machine.

The circular blank for pressing is inserted between the lower face of the cover and the upper face of the body of the press, which, in the normal form of the machine, are kept at a predetermined distance apart by means of a suitable spacing ring, and clamped by means of studs passing through this ring. The inner diameter of the spacing ring is 6 in. The body of the press is of mild steel and has a central bored hole, 2⅛ in. diameter, to provide clearance for the punch and pressing. A hardened steel inner ring inserted in the body forms the essential lower portion of the die, determining the radius over which the sheet shall be bent and (by its inner diameter) the radical clearance to be permitted without ironing of the cylindrical pressing. The normal curvature of the ring (in section) is ¼ in. radius, and several inner diameters have been employed, varying from 2.067 in. to 2.094 in. for blanks 0.036 in. thick.

In order to enable the punch load to be measured and recorded the body of the press takes the form of an annular cylinder of 7 in. outer and 3 in. inner diameter, mating with a piston integral with the rigid cast-iron base. The annular space between piston and body is filled with light oil and communicates with a modified engine indicator, the oil pressure operating the piston and pencil of the indicator. The indicator drum is actuated by a cord which passes round a small pulley on the cover of the press and is attached to an arm projecting radially from the upper end of the punch. In this way vertical movement of the punch is reproduced as horizontal movement on the indicator diagram.

Special Attachment Used

The overall height of the press before action is 11¾ in., and in order to ensure a truly axial thrust it is ball-loaded top and bottom. The machine can be operated according to convenience either by means of hydraulic or lever testing machine, or by inserting it in any commercial type of press in which sufficient space is available.

In order to ensure central location of the blank in the die an annular piece of thin sheet metal is employed, having an outer diameter exactly the same (6 in.) as the inner diameter of the spacing ring and an inner diameter the same as the diameter of the blank to be tested.

It will be seen that, in the form

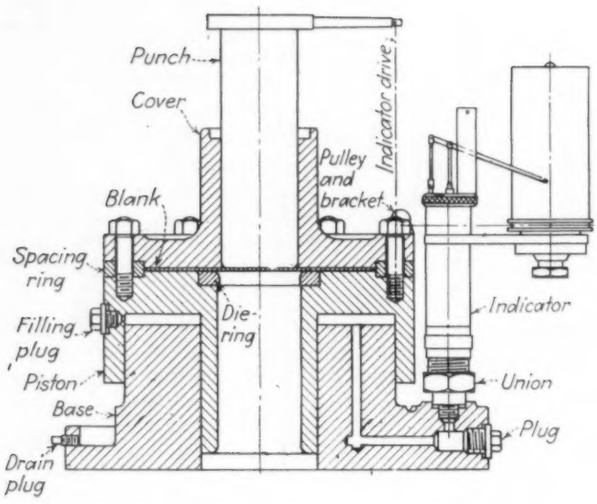

FIG. 1 — Autographic sub-press with spacing ring.

described, the machine does not exert any specified pressure on the blank, but merely limits the puckering or thickening of the blank according to the clearance provided by the spacing ring.

For tests where a controlled blank-holder pressure is required a special attachment has been designed and constructed which can be substituted for the head of the existing sub-press and by means of which prescribed blank-holder pressures up to nearly 10,000 lb. can be applied during pressing.

Hydraulic (oil) pressure is supplied to the upper face of a floating annular piston which transmits the pressure to the upper surface of the blank through a loose replaceable plate of hard steel. The oil pressure is controlled by means of a deadweight gage tester, the ground plunger of which is kept floating during a test by replenishing any leakage by a hand-operated screw plunger. In normal operation this provides a constant blank-holder pressure throughout the drawing process, but by suitable elaboration it could be arranged to vary this pressure as required. The blank-holder pressure attachment does not affect the autographic recording arrangements in any way.

The plate interposed between the piston and the blank and the die plate has been made replaceable so that different forms of plate can be substituted.

Two testing machines have been employed in conjunction with these sub-presses. A multiple-lever machine of 100,000-lb. capacity, fitted with a variable-speed motor, has been used for drawing speeds of from 0.05 in. per min., to 1.5 in. per min., the speed being constant throughout the draw. A hydraulic press of seven tons capacity, which has been used for higher speed work, enables tests to be made at drawing speeds up to about 50 ft. per min.

In order to obtain systematic measurements of changes in thickness in different parts of partial, complete, and broken pressings a special jig has been designed and constructed, suitable for the type of pressing under investigation.

This jig, while entirely satisfactory for measurements on the walls and flanges, is not capable of giving reliable readings of thickness over the radius near the base of the cup, a region in which some of the most important changes actually occur and where the danger of fracture is most real. Measurements in this region have been made by means of a traveling microscope on a diametral section of the cup embedded in wax.

In the course of the present investigation nine different metals were used: mild steel, two brasses, nickel silver, three grades of aluminum, an aluminum-bronze, and electrolytic copper.

Experimental Results

The sequence of the experimental work was determined to some extent by the material available and the progress in construction of the apparatus and accessories, but the results may conveniently be grouped for discussion as follows:

(1) Relationship between blank diameter, punch load and success in drawing.

(2) Strains and stresses produced by cup formation.

(3) Effect of drawing conditions; blank-holding, clearances, curvatures, speed, lubrication.

Owing mainly to the absence of knowledge regarding the stress-strain relationships of metals under plastic conditions it is at present not possible to put forward a theoretical treatment of the drawing process which could aspire to comparison with experimental data, but a descriptive account of the mechanism of radial drawing can be developed from certain simple assumptions regarding the plastic behavior of the material and the conditions of restraint. Such a treatment is outlined in an appendix to the author's paper and the main conclusions to which it leads are:

(1) Hoop compressive stresses are substantially greater than corresponding radial tensile stresses.

(2) These radial tensile (drawing) stresses rise to a maximum and fall again as drawing proceeds.

(3) The maximum drawing tension bears an approximately linear relationship to the blank diameter for a given die.

Punch Loads Important

Early in the experimental work it was established that the maximum blank diameter which can be drawn successfully is a sensitive and consistent function of the drawing qualities of a metal. A series of tests at a slow speed of pressing showed that six mild steel blanks, 4.10 in. diameter, all drew successfully, while six blanks, 4.15 in. diameter, all broke at approximately the same stage of the draw. Of six blanks, 4.125 in. diameter, four failed and two drew successfully. This order of consistency was revealed throughout the testing work when the conditions of drawing were kept constant.

In this connection it should be mentioned that all blanks were machined on the outer diameter before testing and were actually centered in the die by means of adaptor rings; neglecting to observe either of these precautions led to inconsistent results.

Closely related to the question of successful drawing is that of punch loads. In the absence of ironing, if the punch load exceeds the wall strength of the partially drawn cup fracture will occur. The relationship between blank diameter and maximum punch load is therefore of primary importance. Relationships of this kind for various metals are shown in Fig. 2.

It will be seen that the relationship is in each case closely systematic, reflecting the consistency mentioned above and encouraging confidence in

the method of testing. The relationships are approximately linear, with a slight tendency to convexity in most cases.

Comparative Tests

At this stage it may appropriately be inquired whether the drawing test does in fact measure a different property from the cupping test by comparing maximum blank diameters with the Erichsen numbers of the various metals available. The results of comparative tests show that no proper relationship exists between these quantities, so that neither test can be used to predict the results of the other. It is interesting to note, however, that a comparison of the Erichsen values with the depth of punch penetration at which fracture occurred with oversized blanks in the drawing test showed a reasonably satisfactory correlation, a not unexpected result in view of the similar types of strain involved and one which suggests that a cupping test might conveniently be carried out with the same apparatus and dies as the drawing test.

In cases where the drawing test is regarded as a proof test it is only necessary, of course, to demonstrate that a blank of a particular specified diameter will draw successfully. But where it is required to ascertain the actual value of the maximum permissible blank diameter more than one test is necessary and the linearity of the above relationship facilitates extrapolation and so reduces the number of tests necessary to determine the limit. In most cases three tests would be sufficient; one with a small blank and one with a larger but safe blank, to define the diameter/load characteristic, and one with an oversized blank to determine the ultimate punch load. But although with most of the metals tested the punch load at rupture was found to be substantially the same for any oversized blank within reason, this was not true in one or two cases, notably with the half-hard aluminum. In this case the punch load at which failure occurs in an oversized blank is measurably lower than that which a properly sized blank will carry in a successful draw and the larger the oversized blank the lower the failure load. This is due to the observed fact that when a half-hard aluminum blank fails in drawing it fails at an early stage, when the metal carrying the punch load is oblique to the line of action of that load and is therefore subject to a radial "toggle" action. It is a notable fact that of all the metals examined half-hard aluminum differs most widely in its behavior as between the drawing test and the (Erichsen) cupping test, and no doubt the lack of ductility under pure stretching revealed by the cupping test explains the early failure and consequent low load in an unsuccessful drawing test. On the other hand, the behavior of the half-hard aluminum under the compound drawing strain is superior to that of either of the soft qualities of the same metal.

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FIG. 2—Relationship between blank diameter and punch load; 1/4-in. punch and die radii; H.B.B. grease lubricant.

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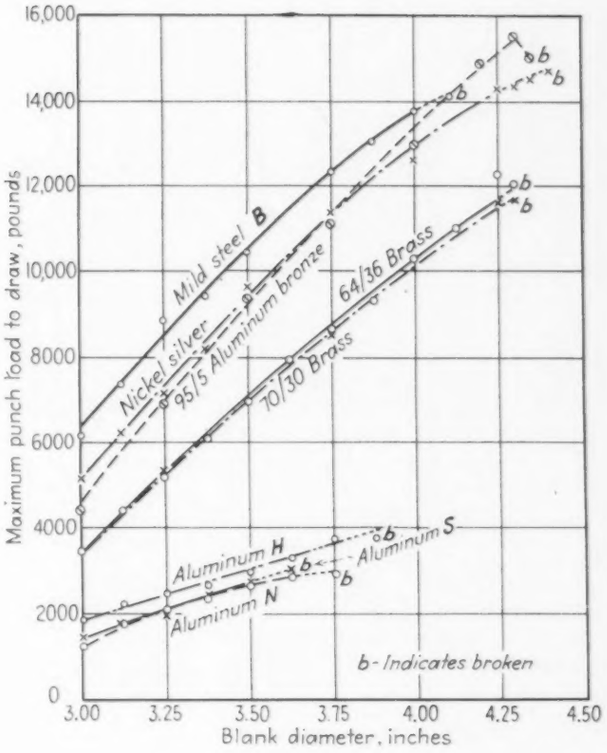


Strains and Stresses

In order to give in a concise form an idea of the actual strains which develop in different parts of a simple cup pressing the three principal strains at five representative points are shown in Table I.

It need hardly be emphasized that failure is most likely to occur where thickness is most reduced, which corresponds to regions where the radial strain is large and is unaccompanied by any important compressive hoop strain (which is the saving feature in the upper parts of the walls). It is interesting to observe that the production of a deep cup in more than one stage is facilitated by the fact that the region of incipient necking is changed at each stage, so that the region which became thinnest in the first operation is subjected to "compressive hoop drawing" in the second and subsequent stages.

Changes of thickness in the base of cups of the particular shape under test were relatively small and uniformly distributed. It is worth recording, however, that these are affected by the speed of drawing. In a cup drawn in one minute from a 4-in. diameter blank (corresponding to a drawing speed of 1.5 in. per min.) the base thickness had diminished by 2 mm. in 36 (about 6 per cent) and no stretcher strains were visible, while in a similar cup produced with a drawing speed of 50 ft. per min. the diminution in thickness was only ½ mm. (about 1½ per cent) and stretcher strains were still developing.

Ed. Note:—Next week the author will conclude this interesting discussion with detailed data on stretcher strains, lubrication, etc.

TABLE I

Representative Strains in Cylindrical Cup
(The figures show the final dimensions of a unit cube of unstrained metal)

Directions	Base	Radius	Walls Bottom	Walls Middle	Walls Top
Hoop	1.13	1.10	0.97	0.66	0.50
Radial	1.13	1.30	1.30	1.50	1.60
Thickness	0.80	0.70	0.80	1.00	1.33

SPECIAL TOOLING FOR MACHINING

AUTOMOTIVE hardware and trim parts are die cast from zinc alloy in exceedingly large quantities in the new plant of the Alemite Die Castings & Mfg. Division of the Electric Auto-Lite Co., Woodstock, Ill. To keep step with this production, it has been necessary to provide for rapid and accurate machining of the parts. This, in turn, requires good tooling, even though a large proportion of the operations are drilling and tapping and none requires heavy cuts. A few of the operations and the tools used are herein described.

Some door handles have a square hole cored for insertion of a steel shank after casting. It is necessary to drill a through hole at right-angles to the cored hole. The setup used is quite simple and is shown in Fig. 1. A handle is placed over a square pin which fits the hole snugly, being pressed on and locked with a quick acting clamp. A pair of pins locate the curved end of the handle to make sure that the hole to be drilled comes on the correct diameter. As the drill is fed downward by a pedal, it is guided by a bushing and passes through a hole provided in the square pin. After drilling, the piece is pushed off the square pin by four pins actuated by a hand lever at the right. In so doing, any burrs left by the drill at the faces of the square hole are sheared off and do not bother in subsequent assembly. Use of a pedal leaves the operator's hands free for loading and unloading the piece. Lubricant is fed from a can seen at upper left, through a sight feed and a tube and onto the bristles of a brush in contact with the drill.

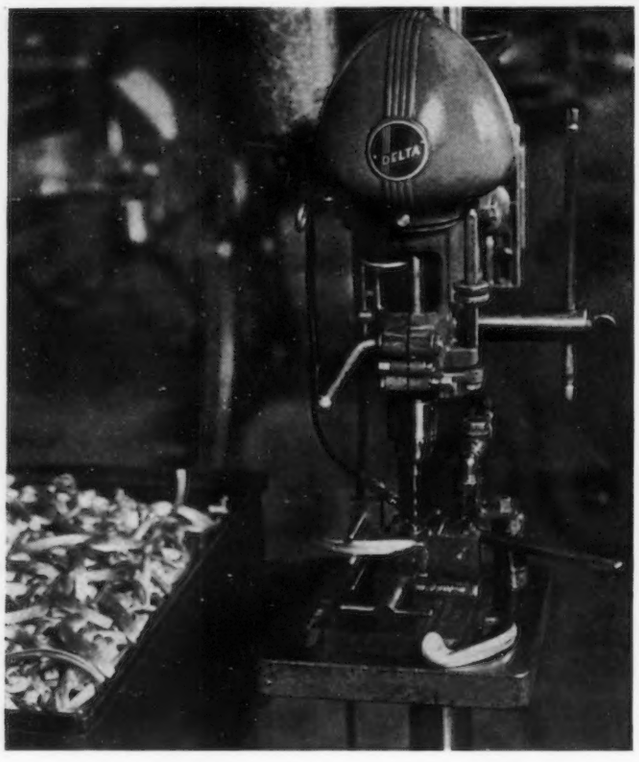
Dodge tail-light housings have three beads around the light opening and necessitate the use of a pair of slides in the casting die. This, of course, leaves a parting line across the center

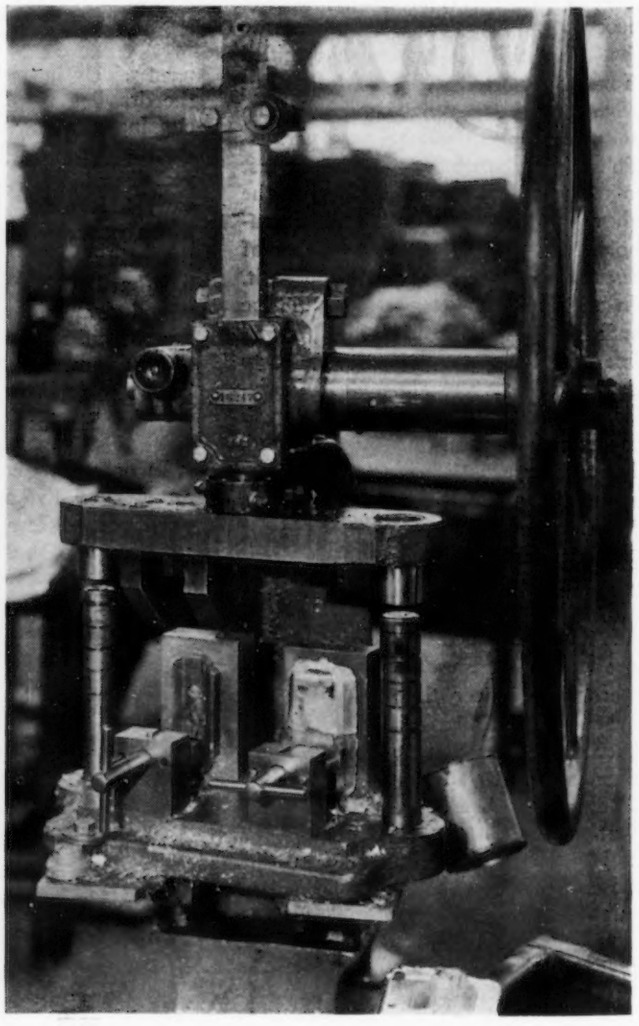
RIGHT

FIG. 2—Arbor press setup with tools for shearing a fin from the parting (at right-angles to beads around the center opening) of tail-light casting.

BELOW

FIG. 1—This door handle casting is pressed on a square pin which fits a cored hole, while another hole at right angles to the pin is drilled.





DIE CASTINGS

By HERBERT CHASE

FIG. 4—In this line, holes are drilled and tapped at odd angles while the casting is held in the Y-shaped ball-mounted fixture. Other holes are afterward drilled and tapped normal to the face of casting.

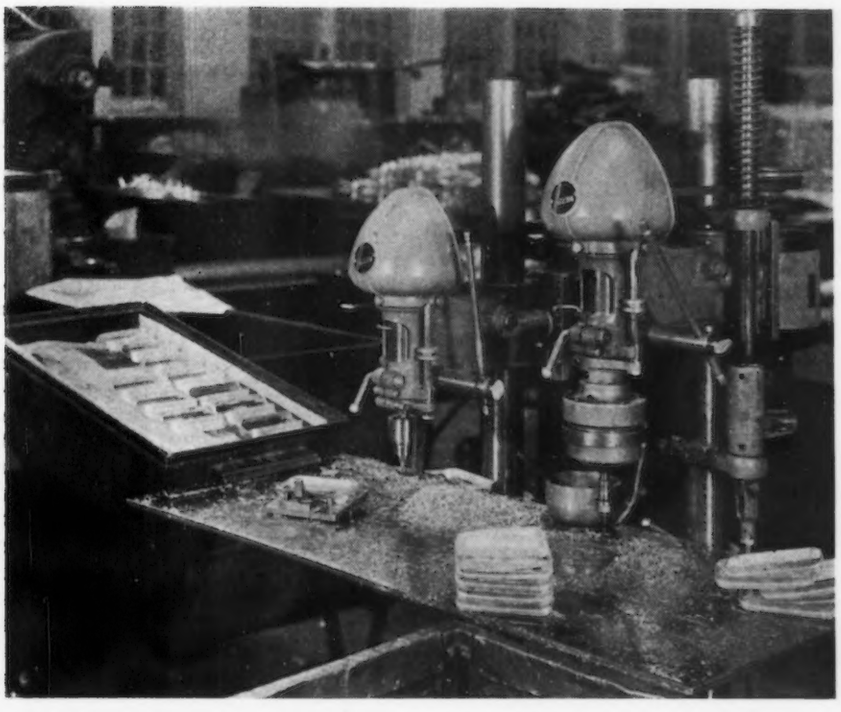


FIG. 3—Rocking fixture used for holding a die casting which requires that two holes be drilled and tapped in each of the two positions in which the fixture is rocked.

of the piece. To remove the fin and the parting line itself the piece is mounted in a dual fixture, shown in Fig. 2, in a hand arbor press. A quick-acting clamp holds the piece in each of the two positions successively and when the shaped tool in the upper half of the die is lowered by the hand wheel the flash is sheared off around the beads and along the side of the piece. After one such operation in the right half of the fixture, the piece is reversed and set in the left half so that the tool can enter from the other side. Another simple trim press operation is required to shear flash from the large central opening and from the periphery of the piece.

After the foregoing operations it is necessary to drill and tap four holes for fastening screws applied in subsequent assembly of the piece to the car. As the piece fits against a warped surface, the axes of the holes are at an angle to that of the main opening and it would make the casting die too complex and expensive to core these screw holes. Since they have to be tapped anyway, it requires very little time to drill them just before tapping. The holes are spotted on the casting by using small conical projections at proper points on the die surface, the angle of the cones being such that they clear the piece as the latter is withdrawn from the casting die. A similar procedure is followed in many castings which have to fit against warped surfaces and require holes at odd angles.

Drilling and tapping of the Dodge tail-light housing is done in the setup shown in Fig. 3. The piece fits into a light fixture which rests on a pair of pins below the center line of the piece. There is a pair of shorter pins at each side of the fixture and also on its two lower faces. These six pins make it possible to tilt the fixture each side of the center line, first one way and then the other and thus bring the piece in correct position for each pair of holes to be drilled and tapped. The pins, of course, raise the fixture slightly above the bed so that chips do not bother. After drilling, the holes are tapped under the spindle of a second Delta drill press, the two presses being set to carry a plate forming a common bed. With this setup, four holes are drilled and tapped in 300 pieces an hour by one man.

Another somewhat similar setup is used for drilling and tapping spotted holes at three different angles in a Willys headlamp adapter ring, Fig. 4. In this case, however, the fixture has a Y-shaped holding portion for the casting, this part of the fixture being mounted on a ball joint carried on a base. The latter is slid along the table from drilling to tapping positions, as required. A bracket attached to one side of the base is so made that it supports the Y-shaped holes at each of the different angles required for the different holes. With this fixture, a single operator drills and taps three holes at different angles in 125 pieces

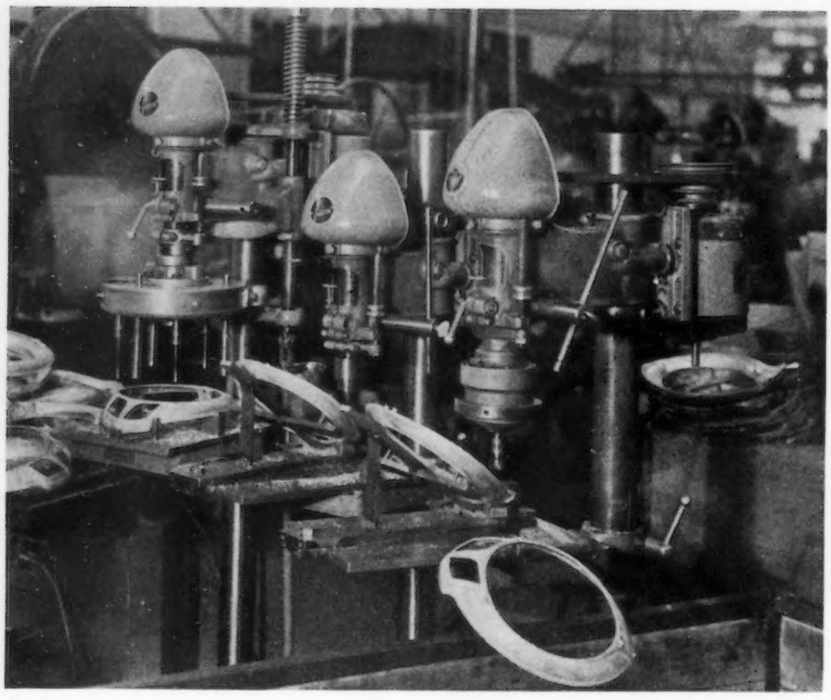


FIG. 5—Setup for simultaneous tapping of three cored holes in a headlamp bezel and subsequent drilling and tapping of an angular hole in a rear face boss.

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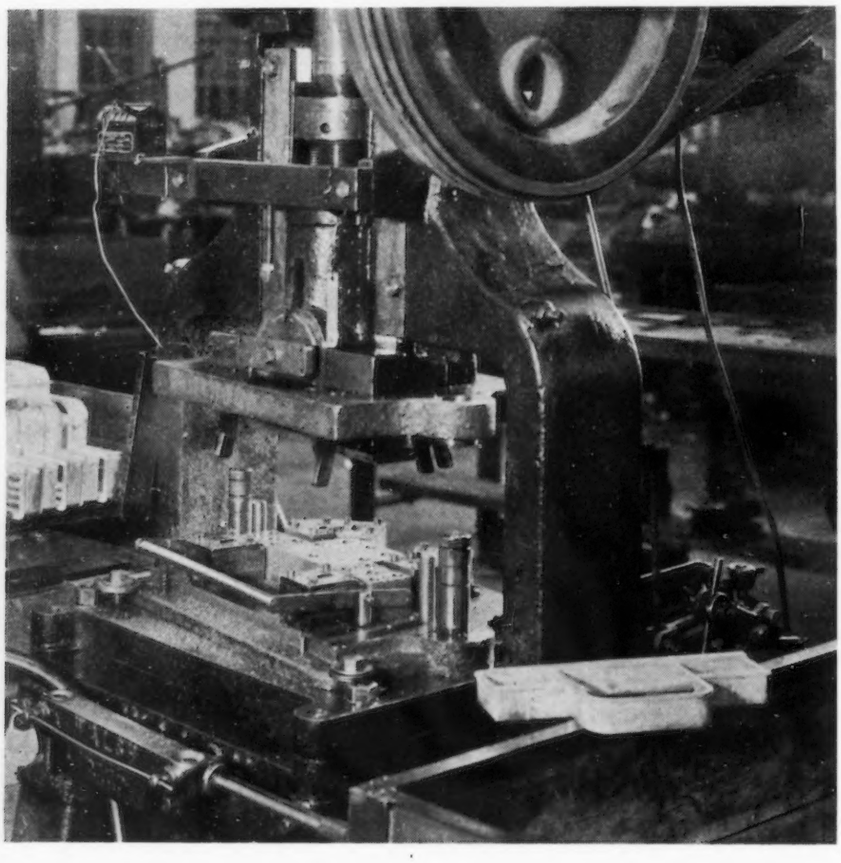
FIG. 6—Punch press equipped with a cam-operated die for simultaneous punching of 12 holes in the die cast instrument frame for a Plymouth car.



an hour. After removal from the jig, which has a snap catch to hold the piece, the latter is passed to a second operator using a second pair of drill presses. He drills flash from eight holes cored normal to the flat surface of the piece and taps these holes, no jig being required.

A large proportion of 1940 cars have headlamps recessed in fenders and use a die cast bezel in zinc alloy which is buffed and plated. These bezels fit crowned or warped surfaces and, as with many other castings, require some holes at odd angles. The bezel shown in Fig. 5, however, has only one such hole, the three remaining ones being countersunk and cored parallel to the axis of the lens opening. These holes are tapped simultaneously in the holding fixture at the left, using a special multiple-spindle head in the drill press. The piece is then turned over and placed successively in the simple fixtures shown for successive drilling and tapping of the angular hole.

Housings in which the instruments for Plymouth cars are assembled are light-wall castings having a large central opening and two smaller openings at the side. In the first operation after casting, this part is placed in a die which shears the flash from all openings and from the periphery in a single stroke of the press. It is then passed to a station where the back edge is sanded, burrs removed and any straightening required is done. The casting is then placed in the cam die shown in Fig. 6 and 12 small holes are punched simultaneously at various points around the side walls. Punches are hidden by the lower die block but are actuated by the angle cams seen in the upper half of the die, after removing the piece from the die, the press operator turns around and reams, counterbores and taps a hole for a jewel (subsequently put in place for use in combination with a pilot light). These operations are performed on three light drill presses not shown in the illustration.

Six Delta drill presses as set up for drilling, tapping and spot facing operations on the tail-light housing, are shown in Fig. 7. Tables of the presses are joined by a strip of steel serving as a common bed along which some of the fixtures are moved. Seven holes are drilled and five of them tapped, some at odd angles. One drilling operation is performed at the station in which the drill head is inverted, this making it easier to clamp the casting quickly in the required position than if the drill head were above the table. Two men operate the entire line and perform all the operations named on

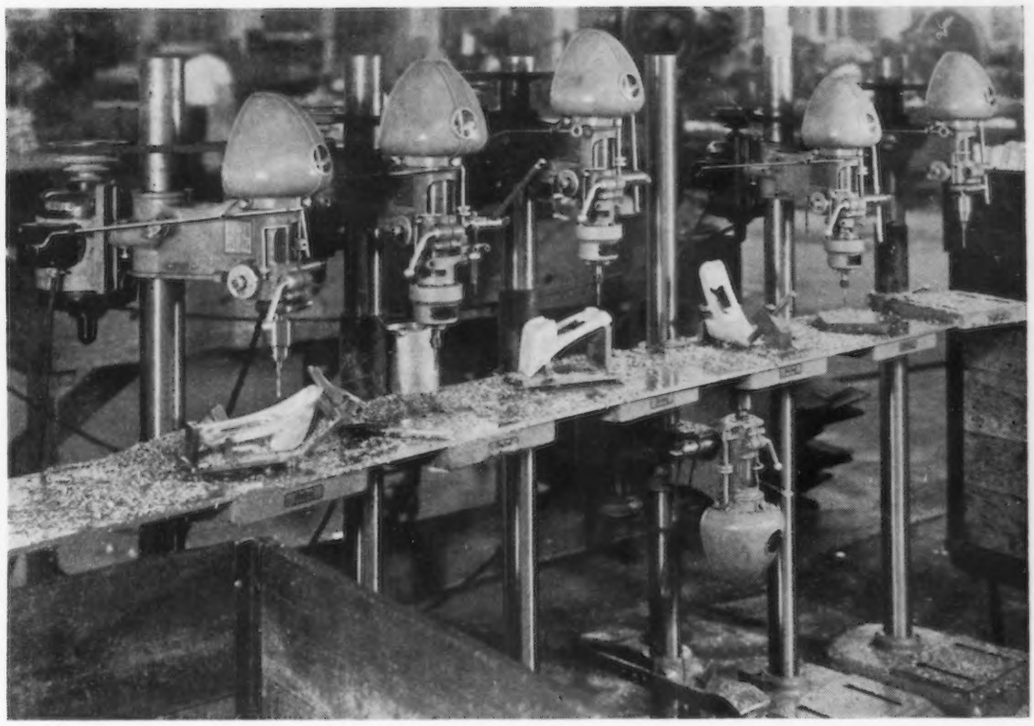
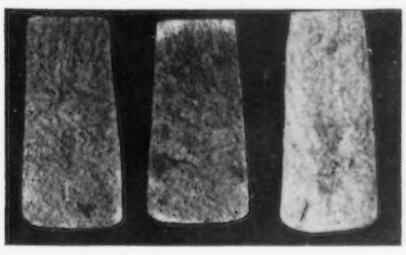


FIG. 7—Six-station drilling and tapping setup, using a rocking fixture at first stations. Inverted press drills a boss.

200 castings an hour. In the foreground is shown the only fixture which is out of the ordinary. It is a rocking type, the two lower faces being disposed at such angles that, after drilling holes normal to one, the piece is rocked to bring the second face parallel to the table for drilling other holes. The piece is held in place by a spring-operated catch seen at the right end of the fixture. Remaining fixtures are simple holding types, one of which is arranged for sliding along the bed as required to bring the piece into correct positions for drilling and tapping.

Numerous other machining operations performed on other castings produced in this plant might be described, but the foregoing are fairly typical. They give a good idea of the general character of work required and of the good tooling which facilitates doing it rapidly.

New Graphitizing Alloy for Ladle Additions



THESE three fractures show the effect of SMZ alloy on white cast iron.

A NEW graphitizing alloy, composed essentially of S, Mn and Zr, has been developed by Electro Metallurgical Co., New York, for ladle addition to cast iron. This alloy, identified as SMZ, is said to be especially effective in converting normally hard white iron into a high strength gray iron. It also reduces the chill of gray iron, minimizes wall sensitivity and improves microstructure with resultant betterment in physical properties, it is claimed.

The effect of SMZ alloy on white cast iron is shown in the accompanying photograph. The base iron used to make the chill blocks illustrated analyzed approximately as follows: 2.30 C, 1.00 to 1.10 Si and 0.30 Mn, and was melted in a commercial air furnace. When enough SMZ alloy was added to raise the silicon content of the iron to approximately 1.60, the iron became almost completely gray except near the chilled edge. When enough of the alloy had been added to raise the final silicon content to 1.90, the iron had become gray throughout.

Addition of sufficient SMZ alloy to a white iron running 2.66 TC, 1.15 Si and 0.36 Mn to boost the silicon by 0.50 per cent, resulted in gray iron having the following physical properties: Tensile strength, 51,700 lb. per sq. in.; transverse strength, 3800 lb.; deflection, 0.415 in., and Brinell number, 207.

DESIGN and FABRICATED

FIG. 1—This welded hydraulic press of 400-ton capacity is a good example of the proportions obtainable for a well balanced design.

By J. H. COOPER

IN this first section of a two-part article the author discusses whether a machine should or should not be welded and, if so, what are the design and welding problems involved. Data are given for those structures which must withstand high total static or dynamic loads.

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THE advantages of the fabrication of machinery by welding have become so well known in recent years that each machinery manufacturer must face the problem of "shall it be welded or not?" Very often the ultimate future of his business rests on the proper answer to this question of fabrication.

Not only is it sufficient to visualize a duplication by fabrication of his product which is at present a casting, but he must also consider *changes in design* which will permit fabrication. Such a decision must be approached with a critical analysis of all factors pertaining to his particular product. The final result which may consist of fabricated steel castings, fabricated rolled steel plate and rolled sections, or a combination of all three, usually is due to fundamental changes in the thinking of his engineering and manufacturing personnel.

In such a case the change-over is seldom done in a radical manner. Standardized products, present machine tool equipment, required additional equipment, yearly volume, stock on hand, and necessity for training a design personnel to properly realize the advantages of fabrication are all factors which must be considered.

Fortunately for the machine tool industry these factors were appreciated by various fabricating concerns well qualified to do this type of work. Such concerns furnish services which on first analysis seem to parallel the services of a foundry. The services furnished by a qualified steel fabricator not only must be comparable to the services rendered by a foundry but must go even farther in fundamental engineering.

Presuming the machine tool manufacturer has reached a decision that his product warrants a change to steel fabrication, what steps should he take? He realizes that in spite of the volume of excellent literature published on fabrication by gas cutting and welding, his engineering staff should take advantage of available engineering knowledge rather than attempt to proceed more or less blindly. A representative of a fabricating concern is asked to go over the line of equipment and make recommendations as to the particular parts which can be most readily changed and produce the most profitable results.

Drawings of these particular parts are submitted to the fabrication engineers, who make up estimates on either a duplicate of the part in fabri-

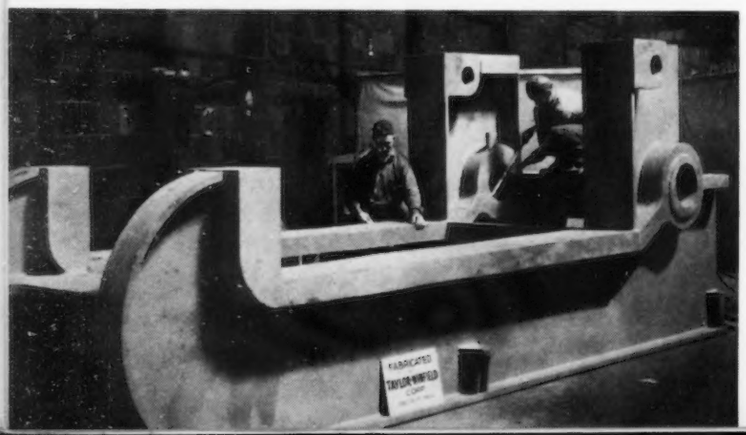

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FIG. 3—The appearance of a large bull dozer "as-welded."

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WELDING of MACHINERY

Welding Engineer, Taylor-Winfield Corp., Warren, Ohio

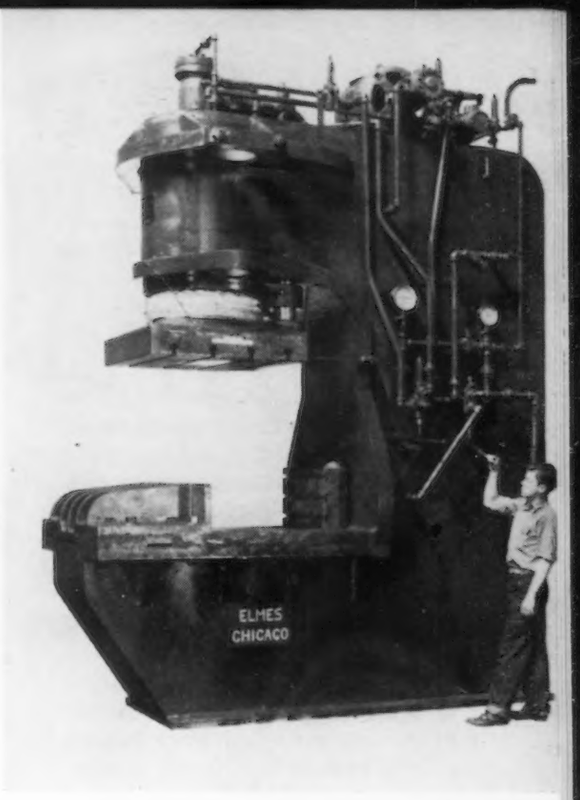

FIG. 2—This welded press is quite similar to that shown in Fig. 1, one difference being the clearance hole in the inner wrapper plate for the clamping ram.

cated steel or a recommendation as to majority of cases also be a fabricating expert. Manufacturers who find it economical to avail themselves of an outside fabricating service constitute a large precentage of the fabricating business today.

A question which is most often pre- a design change. This factor of change of design is of extreme importance. In many instances poor or indifferent engineering design and uneconomical practices have been perpetuated because of possible limitations of foundry practice or limitations in selection of proper materials. Removal of such limitations opens up a new vista of thinking.

The personnel of a fabricating concern must have an intimate knowledge of the requirements of the machine tool manufacturer in order to properly assure the manufacturer the benefits of the change. For example, if the manufacturer puts a premium on weight reduction he must be adequately informed as to proper design to avoid vibration. Proper design as to dynamic loading, hydraulic tightness, composite materials, pre-machining, etc., are part of the responsibility of the fabricator to the manufacturer. These factors are only part of the specialized knowledge required.

The machine tool designer being primarily interested in the features making a good tool cannot in the sented to the fabricator by the machine tool manufacturer who wishes to use fabricated steel is "How can I be assured of obtaining the advantages of fabricated design and costs with a minimum of trouble?" The answer to this question is a many sided one and the balance of this article will be devoted to the factors which make possible a satisfactory solution.

Fabricated steel for the machine tool industry may be classified in the three following major groupings:

(I) Structures which must withstand high total static or dynamic loads.

(II) Structures which are primarily supporting structures or bases for machine tools and often have a secondary function as containing coolant tanks.

(III) Miscellaneous small parts gas cut to shape or gas cut and welded.

Having properly classified any job under consideration the fabricating engineer must have a working knowledge of the direction and magnitude of the stresses in the case of Group I, a full awareness of the importance of appearance and knowledge of coolant paths in the case of Group II, and a background of ingenious economical design for Group III.

Group I

Consideration of any structure falling under the Group I heading will indicate the portions which contain

° ° °

FIG. 4—The same bull dozer as in Fig. 3 but fully finished.

° ° °

the highly stressed sections of weld metal and parent metal. These sections must have properly worked out bevels, contours, and weld-metal cross-sections to obtain uniform unit stresses of magnitudes consistent with proper safety factors.

A good welded design uses a minimum of weld metal. While a welded joint, properly made and treated, is the equal of a homogeneous piece of parent material, the cost per pound of deposited weld metal will average 50c to $1 with normal overhead. Economical design therefore must carefully watch the poundage of deposited metal.

Factors tending to keep weld metal to a minimum are the generous use of gas cut parts and brake bending to eliminate welded joints, elimination of excessively large bevels, use of intermittent welding and arrangement of parts of a structure so that the welds carry minimum loads and so may be smaller.

Typical structures of this group are C-frames and tie rod frames for presses, brakes and shears. Literally hundreds of these have been made, varying in size from a few tons capacity to several thousand tons capacity.

As examples of this type of construction, consider the machines shown in Figs. 1, 2, 3 and 4. This construction makes very efficient use of the weld metal. The upper and lower platens rest on the inner surfaces of the C-frames and the weld metal carries very little of the machine load. The outer wrapper plate gives stiffness to the C-shaped side plates to resist buckling. Some idea of the proportions for a well balanced design may be obtained from the dimensions for the 400-ton hydraulic press shown in Fig. 1. The side plates are 1½ in. thick, the inner wrapper 4 in., the outer wrapper 1½ in. and the lower platen 4¾ in. Such a box section can also provide a convenient hydraulic oil sump. This press frame was fabricated for the Kewanee Boiler Co., Milwaukee, and weighs 11,500 lb.

Fig. 2 is a larger 350-ton press fabricated of plates of almost identical thicknesses as those shown in Fig. 1. The main feature of difference is the clearance hole in the inner wrapper plate for the clamping ram. This joggling press weighs 33,000 lb. and was built for Charles E. Elmes Engineering Works, Chicago.

Figs. 3 and 4 are "as-welded" and finished photos of a No. 10 bull dozer fabricated for the Ajax Mfg. Co., Euclid, Ohio, for railway car work. The finished machine is equipped with an alternating current motor, dual reversing clutches and controls permitting stoppage of the ram at any part of the stroke. Some idea of the capacity may be gained by the fact that the machine will bend cold the 4¾ in. radius on 4 x 6 ft. ore car doors. The inner wrapper for this frame is 6 in. thick and welded to the end sections by 100 per cent welds.

A paramount necessity for the welding of such a rigid structure is to use bevels, welding sequence and weld metal of proper type to avoid either excessive distortion on the one hand or cracked weld metal on the other hand. No trouble from cracking of welds is experienced in a properly designed structure after a stress-relief anneal if such cracks were not previously present. It should be noted that on this frame the bearing housings are steel castings.

These four examples are typical of single job orders for special machine frames, and so maximum cost and time-of-delivery advantages are gained over an equivalent casting where no previous patterns exist. Three to four week deliveries are normal for these structures and are of distinct benefit since machine tool manufacturers are often under considerable pressure for short-time deliveries.

This type of job requires more care in design and manufacturing than the other groups of structures to avoid contours and techniques causing "stress-raisers" leading to a possibility of fatigue failures.

Ed. Note: — Next week the author will conclude with data on the design and welding of structures falling in Groups II and III.

Lead-Sodium Master Alloy Available

LEAD-SODIUM alloys, used in metallurgical work and as drying agents for inflammables, are being manufactured in commercial quantities, according to an announcement from the R. & H. Chemicals Department of the E. I. du Pont de Nemours & Co.

One of the alloys being made by du Pont is marketed under the trade name Hydrone. It is a solid lead-sodium alloy containing approximately 31 per cent sodium in virgin chemical lead. It can easily be melted in a dry iron crucible and diluted with molten lead to prepare alloys of lower sodium content. The preparation of a 10 per cent sodium-90 per cent lead alloy can be carried out in this manner. This avoids addition of pure sodium to lead, an operation requiring special apparatus.

Lead-sodium alloy was said to have demonstrated superior qualities as a safe drying agent for inflammable liquids in place of metallic sodium.

Lead-sodium alloy is now used to a considerable extent as a master alloy in metallurgical work to harden, modify grain structure, deoxidize and refine non-ferrous metals. A smooth evolution of hydrogen is obtained with no sparking when small lumps of Hydrone are immersed in water, liberating 2.4 cu. ft. of gas per lb. of alloy. The product has therefore found use as a source of hydrogen for analytical work, in field welding and in other applications where a supply of pure hydrogen is required.

CASE CARBURIZATION OF STEEL

By E. G. MAHIN

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THE author herein traverses the entire field of case carburization of steel, dealing with theory and practical operation in easily understood language. Last week pack carburizing was dealt with, with data on the reactions involved, sources of carbon, role of energizers, etc. Herein, in conclusion, the pearlite band in a pack carburized case is considered, as also the heat treatment of such cases. There follows a discussion of liquid and gas carburization, and selective carburization.

THE PEARLITE BAND IN THE CASE: When it is considered that the carbon case is formed through two continuous actions, absorption at the surface and migration toward the core, it might be supposed that the line representing the carbon gradient would be a smooth curve, highest at the surface and with diminishing slope toward the core, without breaks of any kind. Assuming a hypereutectoid composition near the surface, the slowly cooled piece would be expected to show the hypereutectoid and hypoeutectoid zones directly adjoining, with no eutectoid zone of appreciable width between. Thus the microstructure of a cross-section would be that of pearlite grains surrounded by a network of cementite on the one side, the network becoming thinner with increasing depth and finally disappearing at the line where primary ferrite first appears.

While the temperature is high and during the progress of carburization this is indeed the situation, and a carbon gradient illustrated by curve A of Fig. 4 exists. Direct quenching of the carburized piece from the box will preserve this distribution of carbon, and this is practiced to some extent. More often, the carburized material is cooled slowly in the box and this cooling is followed by reheating and quenching operations, designed to refine the coarse structure produced by long heating and to obtain the correct hardening. When box cooling is employed a pearlite (eutectoid) band is invariably found, just outside the gradation zone and just under the hypereutectoid zone, if there is such a zone.

This situation is far from being objectionable. Heat treatment produces a zone of certain depth which is of uniform hardness, which would not be the case if carbon continuously decreased in concentration from the surface inward. This adds to the strength of the case and renders improbable early wearing down to softer material.

The curves of Fig. 4 are provided in an attempt to explain the origin of the eutectoid band. Curve A represents the assumed carbon content at varying depths, as it exists while carburization is proceeding. Reference to the iron-carbon phase diagram (shown last week) shows that the transformation temperatures, at which the beginning of precipitation of ferrite or cementite occurs, varies with carbon content on passing from surface to core. These transformation temperatures for the assumed carbon gradient of curve A are plotted as curve B.

The formation of primary ferrite or

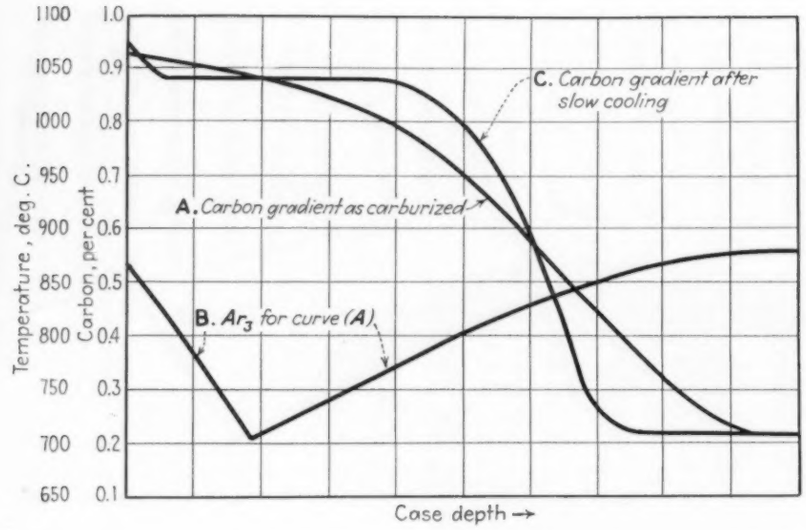


FIG. 4—Origin of the eutectoid band in a slowly cooled, case carburized steel.

cementite from the cooling solid solution is quite analogous to the precipitation of crystallizing phases from ordinary liquid solutions. A certain degree of supercooling occurs, the temperature at which precipitation of ferrite or cementite begins being designated, in iron-carbon terminology, by Ar_3. Interpretation of curve B indicates that the varying carbon content, surface to core, results in a high temperature for Ar_3 at the high carbon surface zone, dropping to its lowest point where the eutectoid ratio of carbon exists, and rising again toward the core. This will cause the precipitation of cementite first in the hypereutectoid surface layer. As soon as the first cementite crystals have appeared here, a "seeding out" effect is produced, carbon moving toward the surface as more cementite crystallizes upon that already formed. This outward migration of carbon in the hypereutectoid zone results in an alteration in the form of the carbon gradient, shown in the left end of curve C.

Passing now to the hypoeutectoid zones, curve B shows that Ar_3 is at its highest temperature in the low carbon core, ferrite therefore precipitating first in this region and at the inner boundary of the gradation zone. The precipitation zone moves outward as cooling proceeds, but now the seeding out is of low carbon ferrite instead of high carbon cementite. The result of this effect is that carbon recedes in the remaining solid solution, moving toward (instead of away from) the previously eutectoid line.

The net result of these two actions is a flattening of a certain portion of the carbon gradient, a narrow band of eutectoid austenite finally transforming to pearlite at Ar_1.

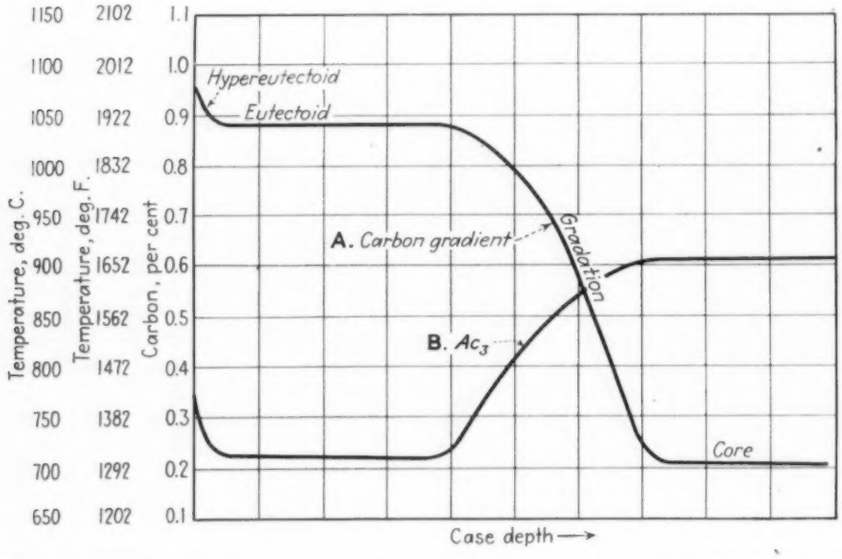


FIG. 5—Curves showing the necessary heat treatment of a case carburized steel, to obtain both grain refinement and hardening.

Heat Treatment

In performing most heat treating operations for the hardening of steel parts it may safely be assumed that the steel is of uniform composition throughout, so that all parts of the piece will respond to quenching operations in the same manner. This is, of course, not true for a case carburized steel. The temperature to which a steel must be heated, Ac_3, to convert it entirely into austenite prior to a successful quenching, depends upon its carbon content. (Ac_3 designates the temperature at which, on heating, the change represented by Ar_3 is reversed. Although Ac_3 is always higher than Ar_3, if heating and cooling are reasonably slow the two temperatures are not far apart and the curves have the same form.)

Since the carbon content varies so widely from surface to core, the curve for Ac_3 plotted against case depth also varies, as illustrated by curve B, Fig. 5. This curve is for the assumed carbon gradient represented by curve C of Fig. 4, reproduced as curve A of Fig. 5. It is observed that the minimum temperature required for converting the entire piece into the solid solution is the temperature required for the core. In this assumed instance this is about 1650 deg. F. Quenching from this temperature would harden all parts of the case, it is true (the core will harden comparatively little because of its low carbon content), but unfortunately this temperature is approximately 400 deg. above that at which the pearlite band is converted into austenite. During this heating to the higher temperature the austenite will undergo grain growth, which is undesirable. As the pearlite band constitutes the most important part of the case, its refinement and hardening are given special attention.

A double heat treatment will solve this difficulty in a fairly satisfactory manner, hardening the case and at the same time refining the coarse grain structure which has been produced by the long heating at the carburizing temperature. The procedure and the purposes of the stages of this treatment are indicated as follows:

(1) The piece is heated to a temperature over Ac_3 for the core, then

quenched in oil. This refines the structure of the core and hardens it somewhat, but leaves this part of the piece in a fairly tough condition. In this stage the eutectoid case is coarsened and hardened.

(2) The piece is heated over Ac_3 for the eutectoid band of the case (about 1400 deg. F.) and quenched in water. The case is thus refined and again hardened, while the core is practically unaffected. Intermediate hardening effects are noticed in the gradation zone, the greatest hardening being just inside the eutectoid band, with hardness tapering off toward the core. This is a desirable condition, since it avoids an abrupt change in hardness and diminishes the liability to spalling in service.

Not all case carburized pieces are subjected to the double treatment just outlined, a single oil or water quenching from the higher temperature serving for hardening, with little attention being given to refinement of grain. On the other hand, even the double treatment may be followed by a "drawing" at lower temperature, the purpose being to relieve some of the internal stresses which were developed by quenching.

Gas and Liquid Carburizing

It was earlier remarked that in all carburizing processes (with the possible exception of cyaniding) gases are responsible for the carburizing action. "Pack," "gas," and "liquid" are merely terms used to indicate the material employed as the original source of carbon.

Of the simple gases, carbon monoxide and the lower hydrocarbons, methane, CH_4, ethane, C_2H_6, and propane, C_3H_8, are most satisfactory. The reactions of carbon monoxide have been discussed in connection with pack carburizing but it must be here noted that, since no solid carbon is present to reduce the carbon dioxide which is formed as a by-product, it is necessary to cause a slow current of fresh gas to pass through the carburizing chamber for sweeping out the carbon dioxide. Otherwise this gas would accumulate and the carburizing action would finally come to rest. The problems connected with manufacturing and storing carbon monoxide in quantity are somewhat difficult, so that pack carburizing is usually the best solution for carburizing with this gas.

In order to illustrate the reactions of the hydrocarbons, methane may be taken as a simple example. When the steel is heated, bathed in this gas, surface solution takes place. Within the solid solution methane decomposes:

$$CH_4 \rightleftarrows C + 4H$$

Carbon remains in the solid solution and hydrogen partly returns to the space surrounding the piece, where it becomes molecular:

$$4H \rightarrow 2H_2$$

The first equation indicates that the reaction of the hydrocarbon within the steel is a reversible one, as was the case with carbon monoxide. And, as in that instance, if the by-product is allowed to accumulate it will slow up, and finally stop, the carburizing action because both carbon dioxide and hydrogen are *decarburizing* agents. Car-

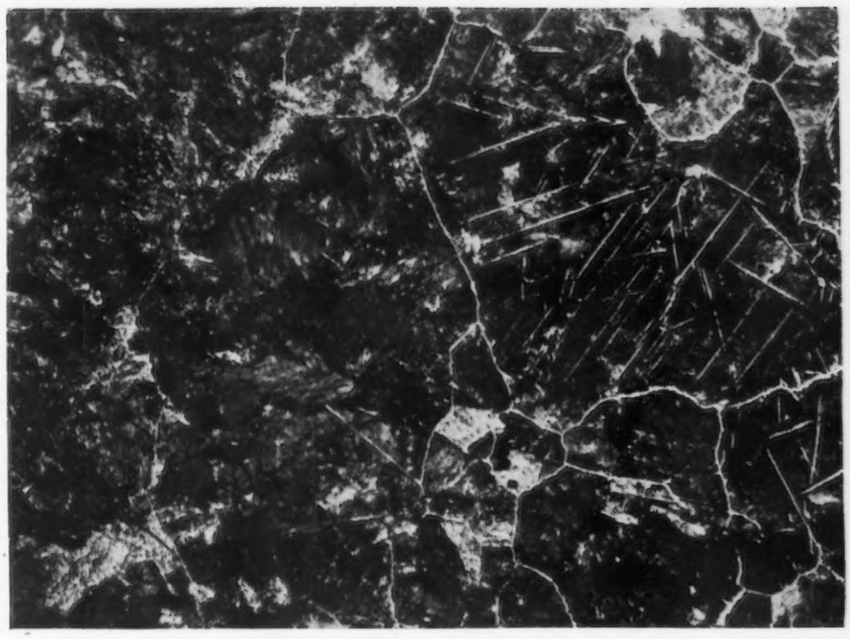


FIG. 6—Microstructure of a case carburized normal steel, hypereutectoid zone and part of the eutectoid zone. Large pearlite grains, with sharp network and needle formation of primary cementite. McQuaid-Ehn test, at 50 diameters.

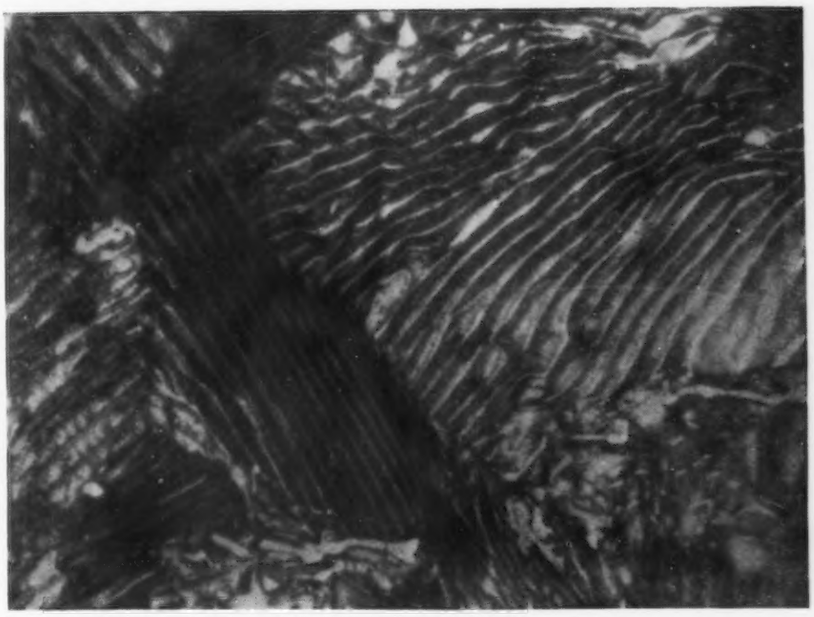


FIG. 7—Lamellar structure of normal pearlite. Alternating thin plates of cementite (bright) and of ferrite (dark). At 1000 diameters.

bon dioxide decarburizes by a reaction noted earlier:

$$CO_2 + C \rightleftarrows 2CO$$

The decarburizing action of hydrogen is due to the formation of hydrocarbons by reaction with carbon already in the steel:

$$4H + C \rightleftarrows CH_4$$

In pack carburizing carbon dioxide is reduced by the solid carbon of the carburizer but there is no such convenient method for caring for hydrogen, so that as in gas carburizing with carbon monoxide, a slow stream of fresh gas must be admitted to the carburizing chamber.

Hydrocarbons of higher molecular weights or unsaturated hydrocarbons are likely to give trouble by "cracking" and depositing free carbon as soot, on the piece and in gas exits. Stoppage of passages and uneven carburization will result.

The various commercial fuel gases, including natural gas, are used for gas carburizing, the composition being modified to suit conditions. All of these gas mixtures contain certain quantities of three decarburizing agents—hydrogen, carbon dioxide and water vapor—and proper account must be taken of these. The simplest equation which will illustrate the decarburizing action of steam involves the formation of methane, although in practice, no doubt, other hydrocarbons are formed. The simple equation follows:

$$2H_2O + 2C \rightarrow CO_2 + CH_4$$

Any gas carburizing process must be designed so as to provide uniform exposure of steel parts to the carburizing gas. This may be accomplished by mechanical movement of the parts, as in rotary retorts, or sometimes by fan circulation of the gases.

Liquid Carburizing

Cyaniding is sometimes classified under this heading, as is the use of compressed and liquefied gases, such as propane. As the tank pressure is relieved by opening a control valve, the material vaporizes so that propane gas is the actual carburizer.

Selective Carburization

It is sometimes desirable to carburize only selected areas on the surface of a fabricated part. Portions of the surface may then be protected by some metal or other material which will itself neither absorb carbon nor transmit it to the steel underneath.

Copper is a conveniently applied metal of this character. If a light coating of paraffin or varnish is brushed on the parts to be carburized and then the entire article immersed in an electrolytic copper plating bath, copper will be plated on all of the surface not covered with the paraffin or varnish. Various "dopes" also are available for depositing copper without electrolytic action. These range from slightly acid solutions of copper salts to pastes saturated with such a solution. When the part not to be carburized is dipped into the solution or when the paste is applied to the surface, copper is deposited by the familiar replacement reaction:

$$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$$

If the shape of the part permits, copper sleeves or other forms adapted to the surface may be applied.

Other methods are used for preventing or minimizing carburization at selected parts of the surface. Excess stock may be left at these parts of the surface, grinding or machining this away after carburization is finished and before heat treatment, or a protective refractory paste may be applied locally and left until the completion of the carburizing process. This is not a good method except in pack carburizing, as the paste may become detached through motion of the carburizing parts in gas carburizing. Drilled holes whose interior surface should not be hardened may be plugged with a refractory paste or cement, or they may be filled with copper plugs.

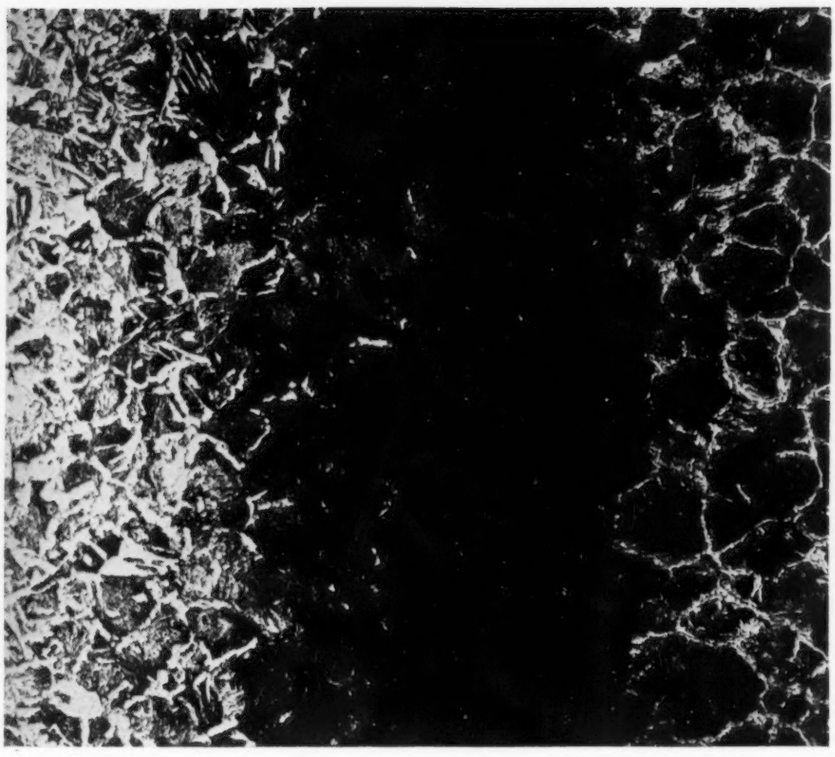


FIG. 8—Microstructure of the case of an abnormal steel. McQuaid-Ehn test. At 50 diameters.

Cyaniding

Case hardening by means of fused cyanides offers a method for producing a hard superficial layer on the surface of a steel in a comparatively short time period of heating. While ordinary box or gas carburizing may require from 3 or 4 hr., for shallow cases, and up to 20 hr. or more for deep cases, the shallow but very hard cyanided case will be formed in a time varying from about 30 min. to 2 or 3 hr. Since this method is usually employed where impression resistance is not as important as wear resistance, the time is more often in the short end of the range indicated.

Because of its relative cheapness, sodium cyanide is commonly used for cyaniding. The bath is made to the required strength by admixtures of inert salts, such as sodium chloride or sodium carbonate. The rate of hardening depends partly upon the concentration of cyanide in the bath. For many commercial operations the low carbon steel to be surface hardened is

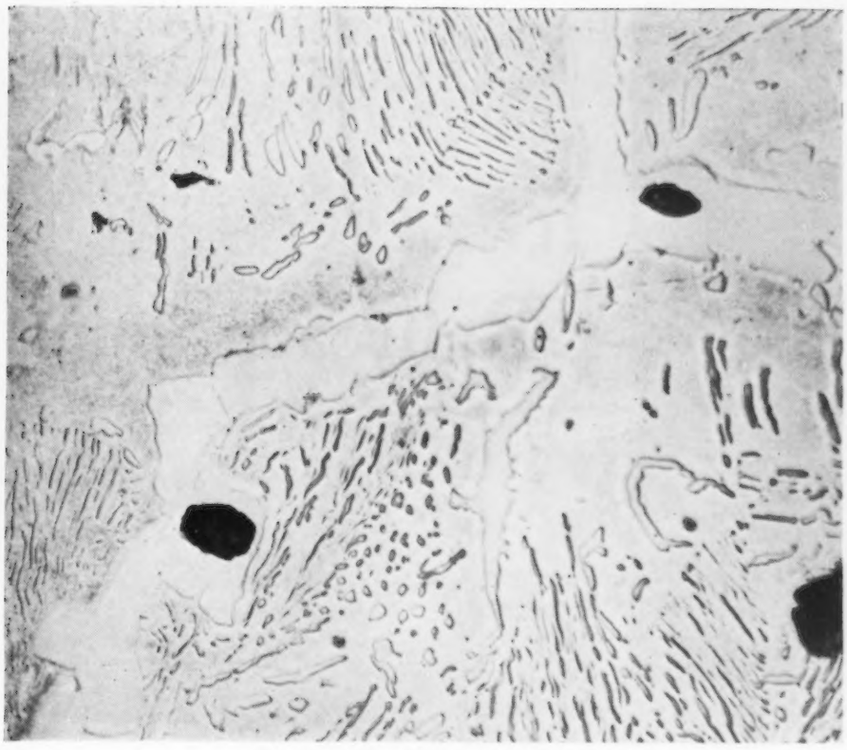


FIG. 9—Divorced pearlite in an abnormal steel. Heavy veins of cementite bordered by massive ferrite. At 1000 diameters.

immersed in the fused cyanide bath containing about 30 per cent of sodium cyanide (higher concentrations also are employed), at temperatures ranging from 1550 deg. to 1600 deg. F.

The rather high degree of superficial hardness which is obtained by cyaniding can scarcely be entirely attributed to the carbon absorbed, since the carbon content, even near the surface of the steel, rarely approaches the eutectoid ratio. It is known that both nitrogen and carbon are absorbed and the cyaniding process is thus a combination of carburization and nitriding, which was practiced long before simple nitriding by ammonia had become commercially practical.

The reactions occurring during cyaniding are somewhat complex. Omitting some side reactions which may have little to do with the actual imparting of carbon and nitrogen to the steel, the essential reactions are probably about as follows:

$$4NaCN + O_2 \rightarrow 2Na_2O + 4CN \text{ (cyanogen)}$$

Some of the cyanogen dissolves in the steel, and in solid solution:

$$CN \rightarrow C + N$$

Both carbon and nitrogen remain in solid solution. Carbon hardens by its well-known action. Nitrogen precipitates as minute grains of iron nitride, which cause slip interference as they do in steel nitrided by ammonia[3].

Containers for the cyanide bath are usually of rolled or cast steel, or of cast chromium-nickel alloys. The initial cost of the last named alloys is high, but the longer life of these materials probably offsets this disadvantage, as in park carburizing.

"Abnormal" Steels

In commercial practice it is found that an occasional lot of steel will fail to harden properly, when subjected to approved carburizing and heat treating practice. After the quenching, it develops that the surface is of non-uniform hardness and microscopic examination shows that certain "soft spots" are of troostitic, instead of martensitic, structure. In the language of the plant, such steels have become known as "abnormal."

In 1922 McQuaid and Ehn showed that "normality" or "abnormality" of a steel is related to the microstructure of the case of a box-cooled piece. A test is made by subjecting a specimen of the steel to heavy carburization, cooling it in the box and then preparing a section for the microscope. The case of a normal steel will have a microstructure as shown in Fig. 6. Pearlite grains are large and well defined. In the hypereutectoid zone the primary cementite is in the form of a sharply defined network surrounding these grains, or perhaps as needles crossing them. The abnormal steel will be seen to have small pearlite grains, inclined to feathery edges, and the cementite network is thick and irregular and bordered by areas of ferrite.

This procedure is known as the "McQuaid-Ehn test" and it appears to be a reliable indication of the uniform, or non-uniform, hardenability of the case carburized steel.

Failure of the abnormal steel to harden properly after carburization appears to be partly or entirely due to the "divorcement" of pearlite during the slow cooling of the carburized piece. Pearlite is an intimate conglomerate of cementite (the carbide) and ferrite, in the form of extremely thin plates or lamellae. (See Fig. 7.) In the abnormal steel these phases divorce, the cementite joining the primary cementite, if this is present, or moving into segregated masses away from the pearlite-ferrite. This structure is shown in Fig. 8, and the divorcement of pearlite in Fig. 9, at higher magnification.

It has already been remarked that upon heating a hypereutectoid steel to above the "critical range" (above Ac_3) the cementite redissolves rather slowly. If present in thin sections only, solution is accomplished readily but the heavy segregated masses of cementite in an abnormal steel do not readily or quickly become redissolved unless long heating at high temperatures is practiced, and this causes undesirable grain growth.

Assuming that not all of the segregated cementite has become redissolved in the reheating previous to quenching, two undesirable results are noticed: (1) Austenite in this region has a low carbon content, therefore it does not attain the necessary hardness upon quenching; (2) the undissolved carbide remains as such after quenching. Being a very hard and brittle phase, it may cause spalling of the case in service.

The cause of abnormality in steel has not been explained in an entirely satisfactory manner but it appears to be intimately related to oxygen content. A steel which has not been adequately deoxidized, or one which has been "killed" by the use of aluminum, will usually exhibit abnormality. While such a steel may be quite satisfactory for other purposes, it cannot readily be made "normal" for carburizing without remelting.

[3] Other explanations of the reactions of cyaniding are given by various authors.

Contour Sawing in Railroad Shops

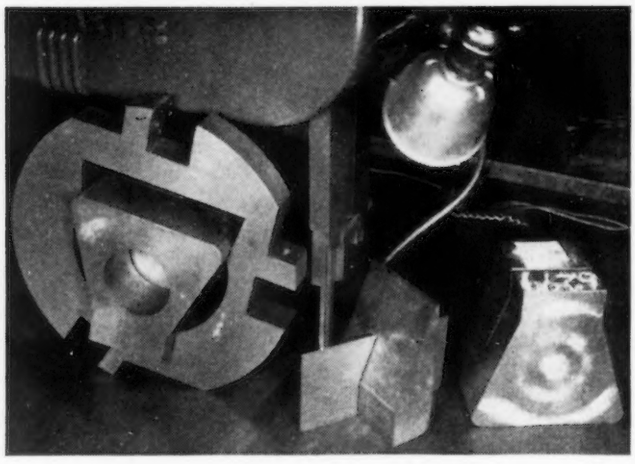
By D. M. SHIELDS

Continental Machines, Inc., Minneapolis

AMONG the modern machine tools which are being used in railroad shops is the DOALL contour sawing machine. This is a machine tool which employs continuous narrow blade band saws to cut shapes and contours in almost any type of material. The unit is also convertible for filing and polishing, so that a job can be carried through to completion on the one machine.

This type of machine provides a cutting process which frequently can take the place of shaping, milling, torch cutting and nibbling operations. And it has completely eliminated the old tedious method of drilling a row of holes to make a cutout. The contour sawing machine leaves a slot only 1/16 in. wide, and the cut is clean and precise. It removes the parts as whole pieces instead of reducing the sections to chips. Furthermore, the tiltable work table permits cutting angle contours in one operation. In this way three dimensional shapes can readily be made out of any material.

A typical example of a contour shaping machine in operation in a railroad shop is shown in the upper accompanying photo. This 36-in. throat machine is in operation at the Cedar Lake shops of the Minneapolis & St. Louis railroad in Minneapolis. A clear idea of the type of work done by contour machining in railroad operations can be gained by examining the lower accompanying photo, which is a close-up of parts made from mild steel forgings. Shown is a jig for turning standard locomotive stoker crankshafts. The two triangular blocks for holding the crankshaft ends were cut on the contour sawing machine from 4½ x 6 x 6½ in. mild steel forgings in approximately 11 hr. The circular notched plate which drives the triangular blocks in various positions was cut from a mild steel disk 1½ in. thick and 11½ in. in diameter in about 3¼ hr.



Railroads do a great deal of torch cutting even on alloy steels, from which the reciprocating parts, that is, valve motion, side and main rods, are made. Often, there is required subsequent heat treatment to relieve strain and stresses set up by the heat of the torch. Parts of this type also can be sawed out of the original bar or stock. The parts are then finished, filed and polished.

A number of different jobs in railroad shops are now being contour machined; for instance, cab fittings, throttle and reverse gear mechanisms, flanges and hub liners, stoker parts, templates, gages, dies, forming tools, not to mention general tool room work. Such work is being done by the Chesapeake & Ohio Railroad; Norfolk & Western Railroad; Chicago, Milwaukee, St. Paul & Pacific Railroad; Erie Railroad, and others. Contour sawing has also been recently adopted by the Bengal Nagpur Railway in Karachi, India, the South Africa Railways and most of the Canadian lines.

What's New in Machine Tool Design

DESPITE the fact that the machine tool industry is constantly expanding its capacity to meet fresh demands, it has still found time to proceed with the development of new ideas, although it was generally assumed last September that new designs would largely be shelved in order to get out production on standard models. This review, compiled from announcements received in the last two months is a cross-section of current design trends. Surprisingly few machines have been designed specifically for war work.

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By FRANK J. OLIVER
Associate Editor, The Iron Age

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POWER shifting of the gears in the speed and feed trains is featured in a new line of plain, universal and vertical dial type milling machines recently introduced by the *Cincinnati Milling Machine Co.* They are built in sizes Nos. 2, 3 and 4 and in medium and high speed ranges. Speeds and feeds are controlled by a single lever at the front of the machine (duplicated at the rear). This lever has two positions. When moved to the speed position, for example, the speed dial rotates until the desired speed is indicated, at which point the lever is released. The proper gears are then in mesh to obtain the spindle speed indicated by the arrow. Feeds are changed in the same manner.

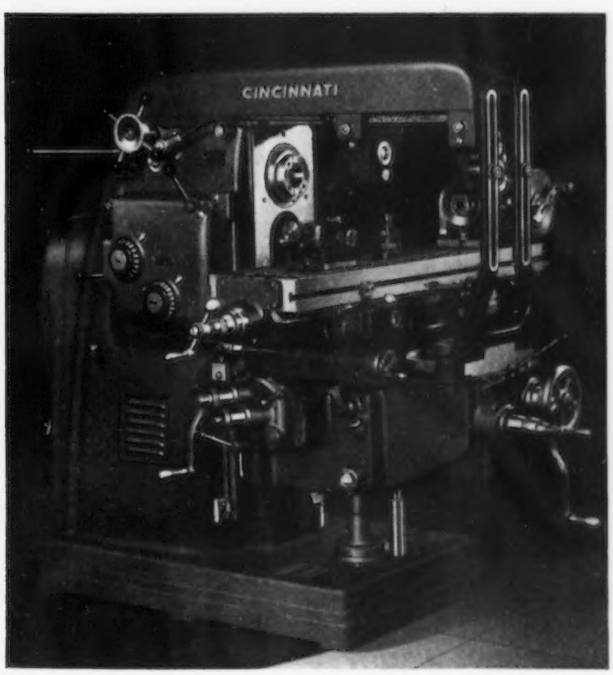
All power control and hand adjustment levers are conveniently grouped at the front operating position and are duplicated at the rear working position at the left of the column. Power feed controls at the front of the knee have been rearranged for greater convenience of operation, being placed near the top to avoid stooping on the part of the operator. All feed controls are of the directional type, and power longitudinal, cross and vertical feeds are engaged by independent levers. These machines have power rapid traverse in six directions.

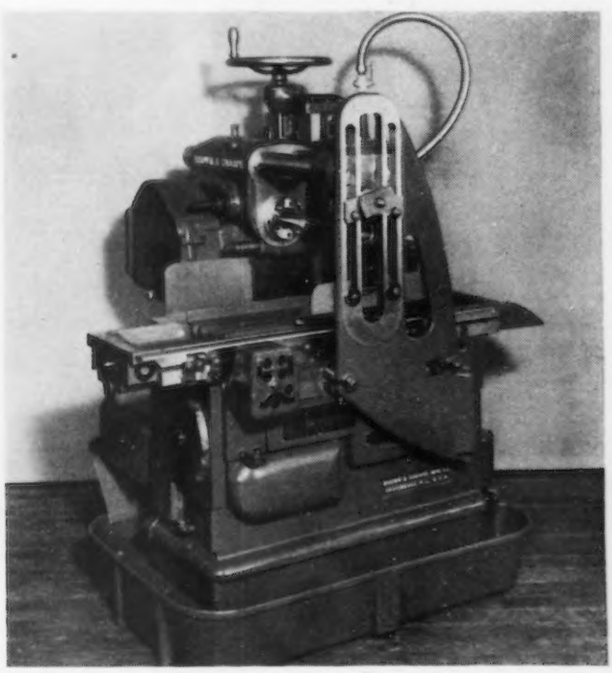
A hydraulic Servo control is used on the spindle clutch so that the work of starting the spindle is effortless and inching is also. The same device controls spindle braking. For hand feeding, the micrometer dials have been redesigned to provide greater convenience, added safety and increased accuracy of setting. Another safety feature is the interlocking of a motor cut-out switch with the hinged motor cover at the rear of the machine.

The column is heavier, and is wider at the base and at the overarm. It is cast of Meehanite and is heavily ribbed throughout. All parts within the column and knee are automatically lubricated. Parts within the saddle are lubricated by a single oil shot system.

Electrically Controlled Miller

THE No. 12 electrically controlled plain milling machine made by the *Brown & Sharpe Mfg. Co.*, has re-

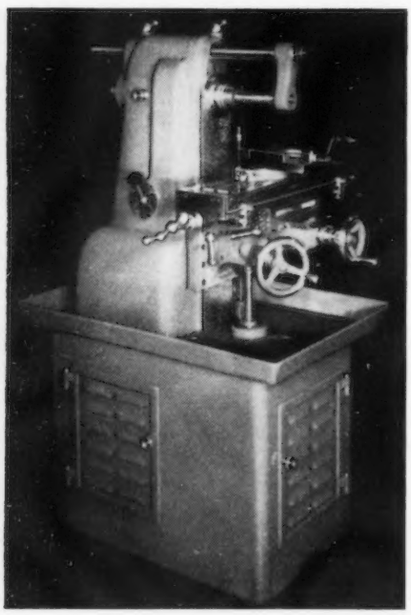




cently been increased in capacity by increasing the height of the column 4 in., thereby providing a corresponding increase in the vertical adjustment of the spindle, to 10½ in. The width of the base has been increased 2½ in., adding that amount to the horizontal dimension of the working space and making the total distance from spindle head face to arbor yoke support, 17¾ in. All features of the original design and construction have been retained, although minor improvements have been made throughout the machine to increase its accuracy and efficiency.

Precision Tool Room Miller

THE TM precision tool room milling machine illustrated replaces the BB5 milling machine made by *Hardinge Brothers, Inc.*, Elmira, N. Y. A longer vertical travel to the saddle has been incorporated to allow the use of the universal index head (optional attachment) in the vertical position. Furthermore, the horizontal



spindle nose and the spindle nose of the index head are identical and of the threaded type, for interchangeability of chucks and other spindle nose fixtures. The horizontal spindle has been extended over the table to permit small end mills to get to the work without the use of overhung adapters.

The TM miller is driven by a two speed reversing motor, V-belted to a four step pulley, giving eight spindle speeds in either direction. The standard range is from 110 to 1850 r.p.m. (2775 r.p.m. optional). Operation is by a single lever on the side of the column. The column has been increased in size for greater rigidity. Machine is anti-friction bearing equipped throughout, including the overarm bushing. Power feed to the table is optional.

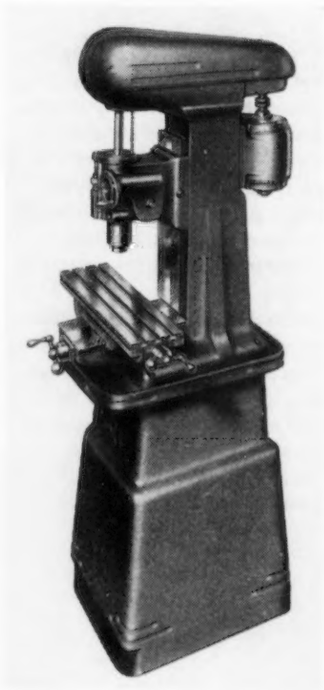
Combination Miller-Lathe

PRECISION lathe, sensitive drill press, horizontal milling machine and vertical miller have been combined in a single unit recently introduced by the *Hannifin Mfg. Co.*, Chicago, for toolroom work. The lathe spindle is hardened and ground, ball bearing mounted, and is designed to take adapters with a B&S No. 10 taper shank. Tailstock has ground gibs on all bearing surfaces. Compound slide, designed for precision work, has rapid adjustment features and an extra strong tool slide. A 4 in. chuck is furnished, also a No. 6-A Jacobs chuck for the tailstock.

The sensitive drill has both rapid hand feed and worm drive feed. Quill and spindle are hardened and ground and the former is carried in ball bearings. Drive of spindle is by a reversible motor at the top of the column. The horizontal milling unit has a table rigidly fitted to a long bearing, with adjustable gib in saddle. A large handwheel with micrometer scales gives rapid vertical feed, and horizontal movements of the slides are by precision screws with micrometer dials.

Combined Miller and Jig Borer

FOR precision work on jigs, fixtures and dies as well as for general vertical milling, the *Machinery Mfg. Co.* P.O. Box 35, Vernon Branch, Los Angeles, has developed the Vernon combination vertical milling machine and jig borer shown. It can be equipped with dial indicators and mea-

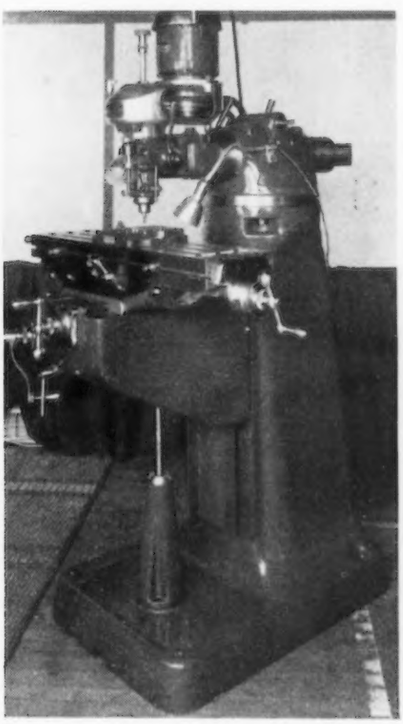


suring plugs for precise layout work, and can be furnished with a profile attachment for duplicating work. Table is 6 x 21 in. and it has a longitudinal travel of 12 in. Maximum distance from table to bottom of spindle is 10½ in. Eight spindle speeds are provided through a new form of back gearing and V-belts. The quill is so arranged that a slow hand feed is provided by handwheel, graduated to 0.001 in., or the rapid traverse feed can be engaged, increasing the feed for drilling or in milling out cavities in dies. A ½-hp. motor is used for drive.

Turret Milling Machine

BY mounting one of the Bridgeport high speed milling attachments on a turret head on top of a column, *Bridgeport Machines, Inc.*, 52 Remer Street, Bridgeport, Conn., has been able to offer a milling machine of unusual flexibility and range. The turret head is 15 in. in diameter and carries a 5 in. overarm. The turret

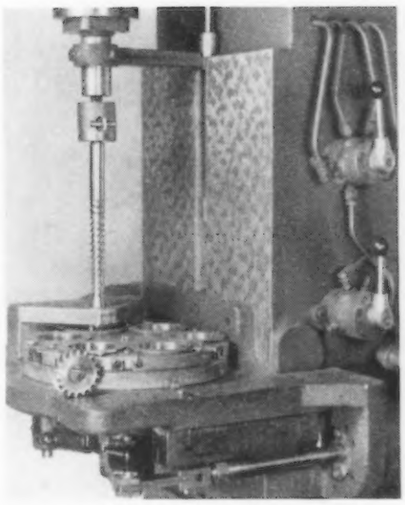
head may be set at any angle in a horizontal plane, and by means of a handwheel the motor and spindle unit may be revolved in a vertical plane about the keyed overarm. There is also provision for a slotting attachment on the other end of the overarm. Column, knee and table are of rugged construction and have wide ways and tapered gibs. Table, knee and saddle locks are conveniently located in the front of the machine. Anti-friction bearings are used throughout. Spindle speeds range from 275 to 4250 r.p.m. Quill travel is 3½ in. and both rack and worm feed are provided. Table



feed is 20 in. longitudinally, 9 in. across. Knee has a vertical feed of 16 in.

Automatic Broaching Fixture

USE of pot type chucks in an indexing table is enabling an automobile manufacturer to broach gear bores at the rate of 450 per hr. on a Colonial open side utility broaching machine. All the operator need do is drop the parts in the pot chucks. At each stroke of the ram, 10 in. for this operation, the table is indexed one-sixth of a turn through a hydraulically operated ratchet and pawl mechanism. A plunger lock is provided to insure accuracy of index location. The finished parts drop out below on the far



side of the machine. The pot chucks are interchangeable for various sizes of work.

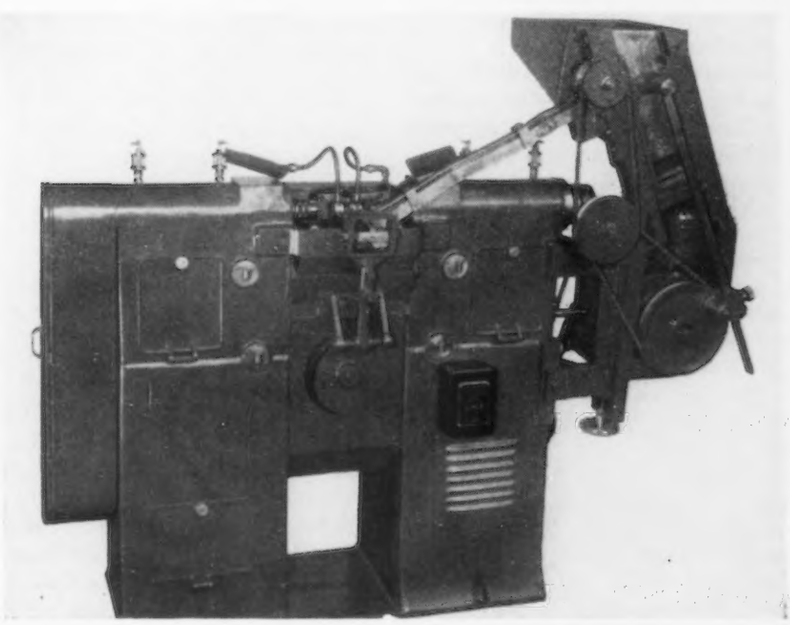
Duplex Drilling Machine

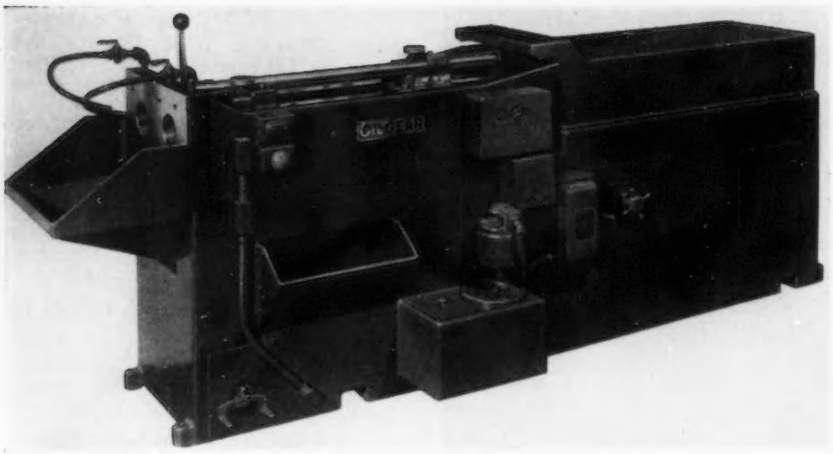
THE *Kent Machine Co.*, Cuyahoga Falls, Ohio, is offering a new type of horizontal duplex spindle drilling machine primarily designed for drilling cotter pin holes in screws or bolts up to 9/16 in. diameter of shank or across the flats of head, although the machine is applicable to a variety of drilling problems of a similar nature. The action of the drill spindles is such that the drills enter the opposite sides of the work simultaneously, but one drill withdraws after it nears the center, while the other drill follows through to complete the hole. The work to be drilled is rigidly held between two grip jaws carrying drill bushings that centralize the work. Drill capacity is ¼ in. diameter.

The drilling speed of spindle, feed of drill and depth of cut can be varied independently. The machine can be furnished either with semi-automatic or full automatic work feeder. The one shown has fully automatic feed, including a hopper and galley to a transfer mechanism which carries the work to the grip jaws. The hopper may be eliminated and the work fed into a short galley to the transfer mechanism. The work may also be fed by hand to the grip jaws.

Twin Broaching Machine

OUTSTANDING design features of the new type XB-12 twin horizontal broaching machine now being furnished as standard equipment by the *Oilgear Co.*, 1314A West Bruce Street, Milwaukee, are: push button and alternative toe lever switch control (also emergency stop push button) on each side of the machine; use of a two-way, variable displacement, heavy duty radial piston fluid power pump with simplified piping and oil circuit; independent variable broaching speed control of each crosshead; use of steel crossheads with bronze liners guided on hardened and ground steel ways; and honed steel cylinders flanged to the alloy iron trough, which in turn is supported by a welded steel frame. Preset relief valves built in the pump protect work, tools, pump and machine against overload. Normal





pulling capacity is 12,000 lb., with peak load of 18,000 lb. Cutting and return speeds vary from 4 to 30 ft. per min., with stroke of 36 in. The two crossheads are 10 in. apart.

This machine is especially designed for high speed internal and external broaching operations on small and medium sized parts. The two rams work alternately, so that production is limited only by the operator's ability to serve the machine. Space is provided on the faceplate for mounting of duplicate, complex fixtures. Each puller has independent vertical adjustment. For supporting long tools, Oilgear supplies a standard trough which is bolted to the machine faceplate.

Gear Tooth Pointing Machine

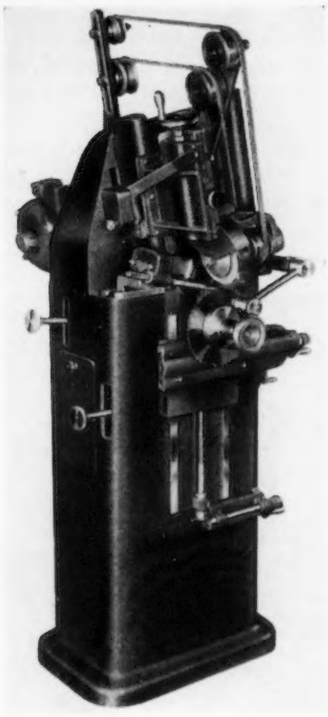
SLIDING helical gears are now being pointed with an included angle of less than 90 deg. between the bevels of the chamfer, thus reducing gear wear and promoting easier and quieter gear shifting. The *Cross Gear & Machine Co.*, 3250 Bellevue Avenue, Detroit, has developed its No. 62 gear tooth pointing machine especially for this work. The two cutter spindles are adjustable angularly in relation to the work. Each cutter takes care of one side of the gear teeth. Two teeth are cut with each revolution of the cutters which are relieved to pass one gear tooth through each gap, thus making it possible to cut 1500 teeth per min. under normal operating conditions. Actually a series of cuts are taken in rapid succession while the cutter is being fed into depth.

Pitch changes and modifications of form are made by altering the inside contour of the cutter, and indexing changes are made through change gears. Features such as calibrated universal adjustments, variable hydraulic feed, timing synchronizer and standard work holding fixtures are incorporated in the machine to make it

flexible. The average set-up can be made in 20 min. This No. 62 Cross machine will finish gears up to 12 in. diameter with 12 in. face capacity, 4 pitch or finer.

Cold Saw Tooth Grinder

THE *Covel-Hanchett Co.*, Big Rapids, Mich., has introduced its new 11-30 precision type metal saw sharpening machine, especially designed to simplify the task of sharpening the high efficiency saw blades now coming into wide use on modern high powered cold sawing machines. The teeth of such saws must be ground to greater accuracy than the teeth on ordinary metal saws in order to operate at the high rates of speed at which these saws are run. Hence in this machine, anti-friction bearings are used throughout and the cam action is such design that teeth of the proper shape can automatically be ground with the desired clearances. Where the saws



have alternate high and low teeth to assure distribution of the load between the teeth, the grinding is accomplished automatically in this machine and the high teeth are beveled on each side to insure the proper cutting action. Tooth shape is such as to secure a curling action of the chip being cut.

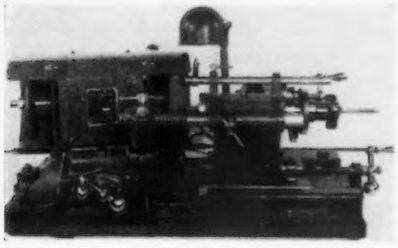
The No. 11-30 machine is also available with hack saw attachments to sharpen the new high efficiency hack saw blades.

Tap Chamfer Grinder

UNIFORM relief can be ground on the chamfer of each land with the J-B tap chamfer grinder developed by the *Edward Blake Co.*, 53 Marshall Street, Newton Centre, Mass. This self-contained unit consists fundamentally of a base on which are mounted a motor wheelhead unit and a workhead unit. The latter is mounted on a slide with screw feed for adjustment to length of taps up to 5 in. on centers. In addition, the workhead unit is oscillated on a lower shaft in the base plate through an adjustable eccentric mechanism and crank. The

desired relief is obtained by modifying the eccentric set-up. The crankshaft spindle is connected with the work spindle through a train of gears, one of which must be changed when the number of flutes on the taps vary. Range is two to five flute taps.

Taps may be held either on center or in collets. Bell centers are also provided for holding square ends in the collet. The motor is mounted on

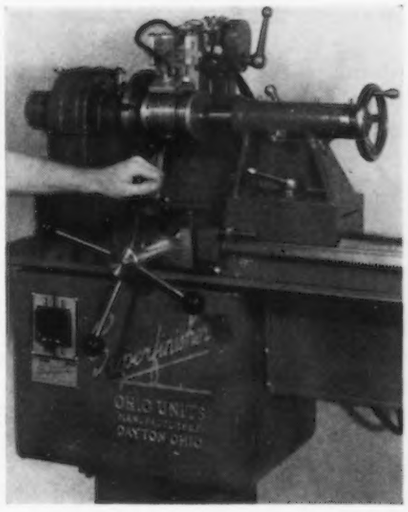


a swivel base and can readily be adjusted to the desired chamfer angle. A hand screw feed permits feeding of the grinding wheel to the work and back to the diamond for dressing. A 6 in. diameter by 1¼ in. face cup wheel is furnished, also a 5 in. diameter by ¼ in. face rubber wheel for polishing flutes.

Floor Stand Grinder

PICTURED below is the new type WS 3-hp. wide swing grinder recently added to the line of *Hammond Machinery Builders,* 1612 Douglas

Avenue, Kalamazoo, Mich. This is a four bearing machine with boiler plate guards for 14 in. wheels. Distance between wheels is 36 in. so that this grinder is especially useful on those classes of work where extra working space around the wheels is an advantage. Base size is 24 x 24 in.



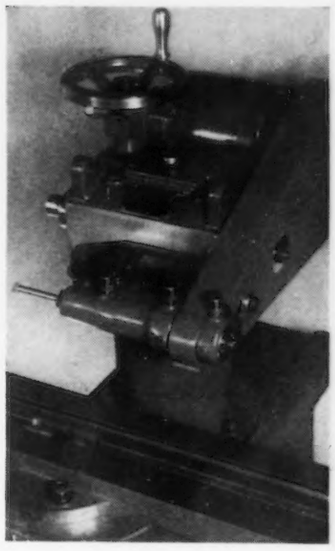
General Purpose Superfinisher

UNDER license of the Chrysler Corp., *Ohio Units,* Dayton, Ohio, is offering its model N-301 general purpose Superfinisher for use in finishing round objects like pistons and crankshafts or flat disks like flywheel faces. Built like a lathe, with revolving headstock and movable tailstock, it accommodates work of 14 in. swing over the bed and 11 5/16 in. over the carriage, with 49 in. length between centers. Only a portion of the bed is shown in the piston set-up.

The oscillating head which carries the Superinishing stones is mounted on a carriage which may be traversed by handwheel to permit the stones to come in contact with the full length of the work. This head is driven by flexible shaft from the main, 1/3-hp. motor under the headstock. Pressure of the stones against the work is controlled by an adjustable helical spring. A steady stream of lubricant is delivered the work through a flexible tube from a gear type pump. Suitable fittings are supplied for connecting this tube to various stone holders.

Internal Grinding Attachment

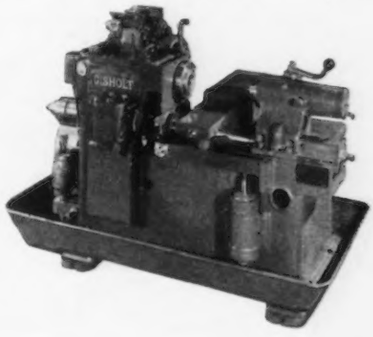
FOR use in conjunction with the revolving spindle headstock of its No. 10 cutter and tool grinding machine, the *Brown & Sharpe Mfg. Co.* is offering an internal grinding attachment, permitting the precision grinding of holes up to 2½ in. in length and of ½ in. minimum diameter in work of 6¾ in. maximum swing. The spindle, which is driven by endless fabric belt from a pulley on the motor, runs at 22,500 r.p.m. and takes wheels of ½ in. diameter. At the wheel end the spindle is carried in a long adjustable phosphor bronze bearing and at the pulley end on a pair of self-alining



ball bearings. The casting in which the spindle is mounted is bolted to the finished face of the machine column. Attachment includes a height gage for permitting setting the spindle at exact center height.

Hydraulic Automatic Lathe

A NEW hydraulic automatic lathe for between centers and chucking work on production turning jobs such as gear blanks, pistons, small impellers and flywheels, has been announced by the *Gisholt Machine Co.,* 1215 E. Washington Avenue, Madison, Wis. Known as the No. 12, this lathe provides for a swing of 16¾ in. over the bed or 12 in. over the front carriage, with a length between centers of 22 in. Features include a simplified hydraulic control system which permits handling all function of the machine by means of a single lever. Front



carriage and rear slide have independent hydraulic feed through separate pumps, both geared to the spindle. Main clutch and spindle brake are also hydraulically operated. Standard range of spindle speeds is from 62 to 335 r.p.m., selected by pick-off gears.

Automatic Knife Grinder

AN improved type B automatic knife grinder has been added to the line of *Samuel C. Rogers & Co.*, Buffalo. It is made in five sizes to accommodate knives from 26 to 54 in. long, either with the edge up or with it down, including paper and woodworking knives as well as light shear blades. Some of the features are a heavy, reinforced bed, sturdy knife bar and increased weight, all combined to provide greater accuracy and long service. Grinding is done by a 10 in. wheel driven by a 1½-hp. motor.

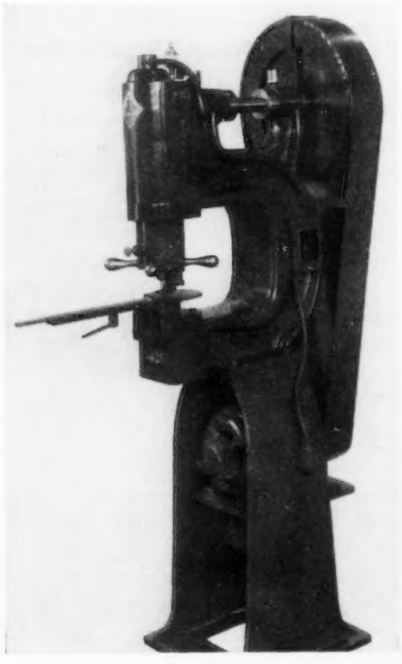
Internal Threading Fixture

ALTHOUGH the Landmaco threading machine made by the *Landis Machine Co.*, Waynesboro, Pa., is designed primarily for cutting external threads, in the set-up pictured, the machine is equipped with a Landis style ALT collapsible tap to permit the cutting of internal threads on the fuse plug end of shells (75 mm. size shown). Special accessories for this arrangement include a gage arm, special round grips and a work supporting cradle. Since the tapped thread bottoms against a shoulder, the gage is used to accurately locate the shell axially. The wide faced grips are ground to the work diameter to assure correct alinement of the work with the spindle. The special work supporting cradle, located back of the carriage front, also is ground to conform to the diameter of the work. Production is said to be 300 to 400 per cent higher than that obtained with previous threading methods.

Chamfering of the end of the shell can be done by a set of milling cutters incorporated in the tap.

Nibbling Machines

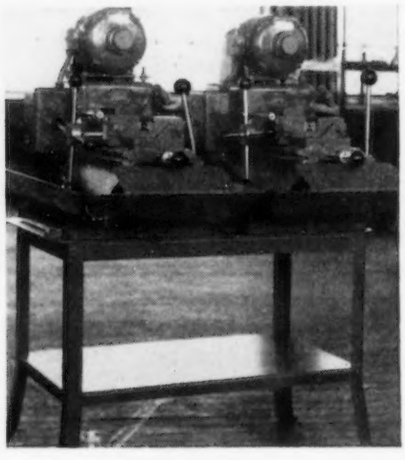
A NUMBER of improvements have been made in the line of nibbling machines made by the *W. J. Savage Co.*, Knoxville, Tenn. These nibblers



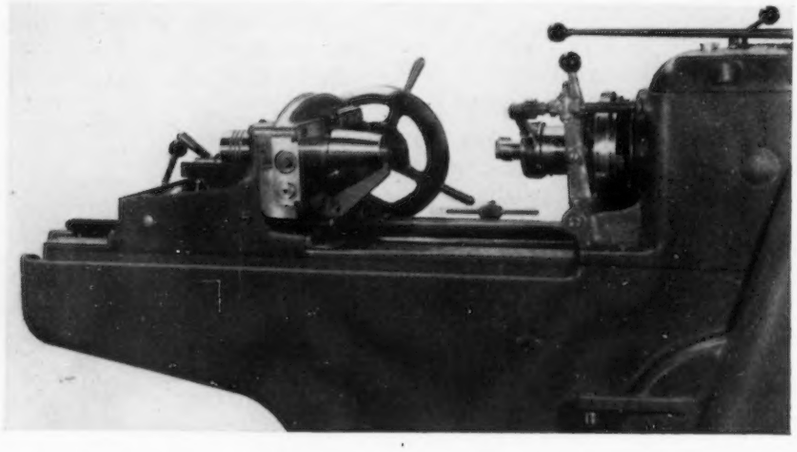
are made in cutting capacities in mild steel up to ⅞ in. and in throat depths of 9 to 36 in. The direct-over-center drive feature adds power to the machines, and a totally inclosed revolving head simplifies operations. A patented toolholder and upset head tool makes it possible to cut stainless and other alloy steels as well as soft, non-ferrous materials. Starting holes are punched under power. Tools and dies are made of high speed steel. Another improvement is the removable material support plate, full depth of throat. A new size has been added to the line having a capacity of 5/16 in. On this size, sheets 24 in. wide and any length are handled due to the revolving head feature which permits cutting any angle on a full circle.

Double Spindle Threading Machine

DOUBLE spindle threading machines are economically justified where the length of thread is sufficiently long to allow the operator time to unload and chuck one work holding device while the thread is being cut in the other. The *Geometric Tool Co.*, New Haven, Conn., has recently developed such a machine, made up of two independent threading units, each having an individual chip pan



and independent lubricant pump. Threads of different size and hand may be cut in each unit, or only one unit may be operated on short thread work. The machine is furnished in three sizes with a complete threading range from 1/16 to 1½ in. (National fine thread series pitches only in the large diameters. Machines are all designed for precision threading, with unique adjustment features, choice of special holders and other characteristics similar to those found on the line of Geometric single - spindle threaders brought out last year.

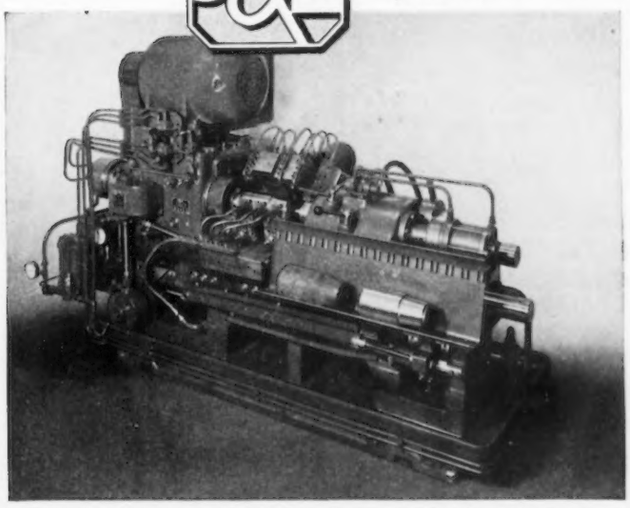


REDUCE operator fatigue

AND INCREASE PRODUCTION ON HEAVY WORK

with a Jones & Lamson 16" Fay Automatic Lathe equipped with a Patent Hydraulically Operated — Quick-Loading — Tailstock

When machining parts made from rough, heavy forgings such as Oil Well Tool Joints, Airplane Engine Cylinders, etc., the loading and unloading of the work into and out of the machine is a factor of major importance. Fatigue of the operator may cause personal injury, or damage to the machine and undoubtedly cuts down production.

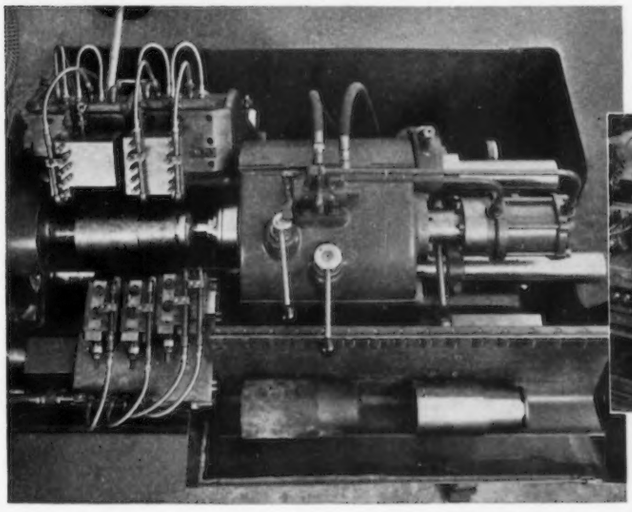


Jones & Lamson 16 x 33" Fay Automatic Lathe with Patent Hydraulically Operated Quick-Loading Tailstock.

Patent Hydraulically Operated—Quick-Loading —Tailstock Eliminates Operator Fatigue on High Production of Heavy Work

The forging of the Oil Well Tool Joint illustrated, weighs 50 lbs., and the floor to floor time of 3 minutes easily allows two machines to be run by one operator and produce 40 parts an hour. *The Patent Hydraulically Operated Quick-Loading Tailstock makes this possible without undue strain on the operator* and the average loading time is only 20 seconds. In continuous high production, machines equipped with this tailstock can be run in conjunction with a conveyor system to provide an even flow of finished parts for the next operation.

Submit your problems to Jones & Lamson Engineers for a profitable solution.



Tailstock Open

Rough turning and facing an Oil Well Tool Joint on a 16 x 33" Fay Automatic Lathe with Patent Hydraulically Operated Quick-Loading Tailstock.

Material: Steel Forging
Tools: Carbide Tipped
Total Length of Piece: 12"
Floor to Floor: 3 minutes

JONES & LAMSON MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

MANUFACTURERS OF: SADDLE & RAM TYPE UNIVERSAL TURRET LATHES . . . FAY AUTOMATIC LATHES . . . AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES . . . AUTOMATIC THREAD GRINDING MACHINES . . . COMPARATORS . . . TANGENT AND RADIAL, STATIONARY AND REVOLVING DIES AND CHASERS

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Automobile industry is preparing to gear itself for national defense program . . . Motor car program meanwhile is subject to some dislocations . . . New executive personnel for GM's Detroit Transmission plant

DETROIT — The immediate concern of the automotive industry is with retail sales, the production pace in the final stretch of the model year, estimates for cleanup buying of various materials and parts and the stage-setting for initial 1941 model production. Each of these has its difficult aspects and no one knows yet just what careful adjustments may be required to regain some measure of certainty and smoothness in planning and operations. In a period when the assembly lines of Detroit play such an important part in war defense measures, dislocations and disruption of the peacetime pace are expected, and Detroit is preparing to gear itself accordingly.

Mostly because of Memorial Day, but partly because of abnormal influences, the industry reduced its output last week. Most plants worked only three days, closing Wednesday for the rest of the week, but only two days were worked by one important group of plants taking cognizance of field stocks which appear slightly inflated in contrast to retail sales rates in very recent weeks.

Assemblies for the week totaled 60,980 passenger cars and trucks in the United States and Canada, compared with 96,810 in the previous week and 32,445 in the corresponding week of last year, according to Ward's Automotive Reports. This decline is not severe in comparison with records of the last two years. A 52 per cent drop was registered in the holiday week last May, and a 28.5 per cent drop in May, 1938. Currently the decline is about 27 per cent. It is not expected that the rebound in June will carry the industry back to its May levels. That has not been the pattern in previous years and is less likely to be the case this year.

Sales Outlook Uncertain

THE immediate sales outlook was summarized here a week ago, and no considerable alteration of the facts is apparent yet. Data for the final 10 days of May will not be available for several days, but they should offer at least a clue to tell whether the retail buyer has yet recovered from depressing effects of recent war news. Probably not apparent yet, there is likelihood of a buying rush if the public decides that there might be a car shortage.

A real used car shortage already is predicted by the National Used Car Market Report, Inc., whose general manager, George A. Leukhart, says, "When it becomes difficult to obtain new cars or it is necessary to wait too long for delivery, many who otherwise would buy new cars will turn to the purchase of late model used cars. This increased demand for used cars would naturally create a used car shortage in many sections of the country. . . If full emphasis on the preparedness program utilizes labor, plant, money and materials for any length of time, both new and used cars may become scarce." His warning to dealers climaxed a period when there existed some cause for fear that wild trading for new car sales might freeze dealer capital in older models. In general, however, the used car situation is well in hand.

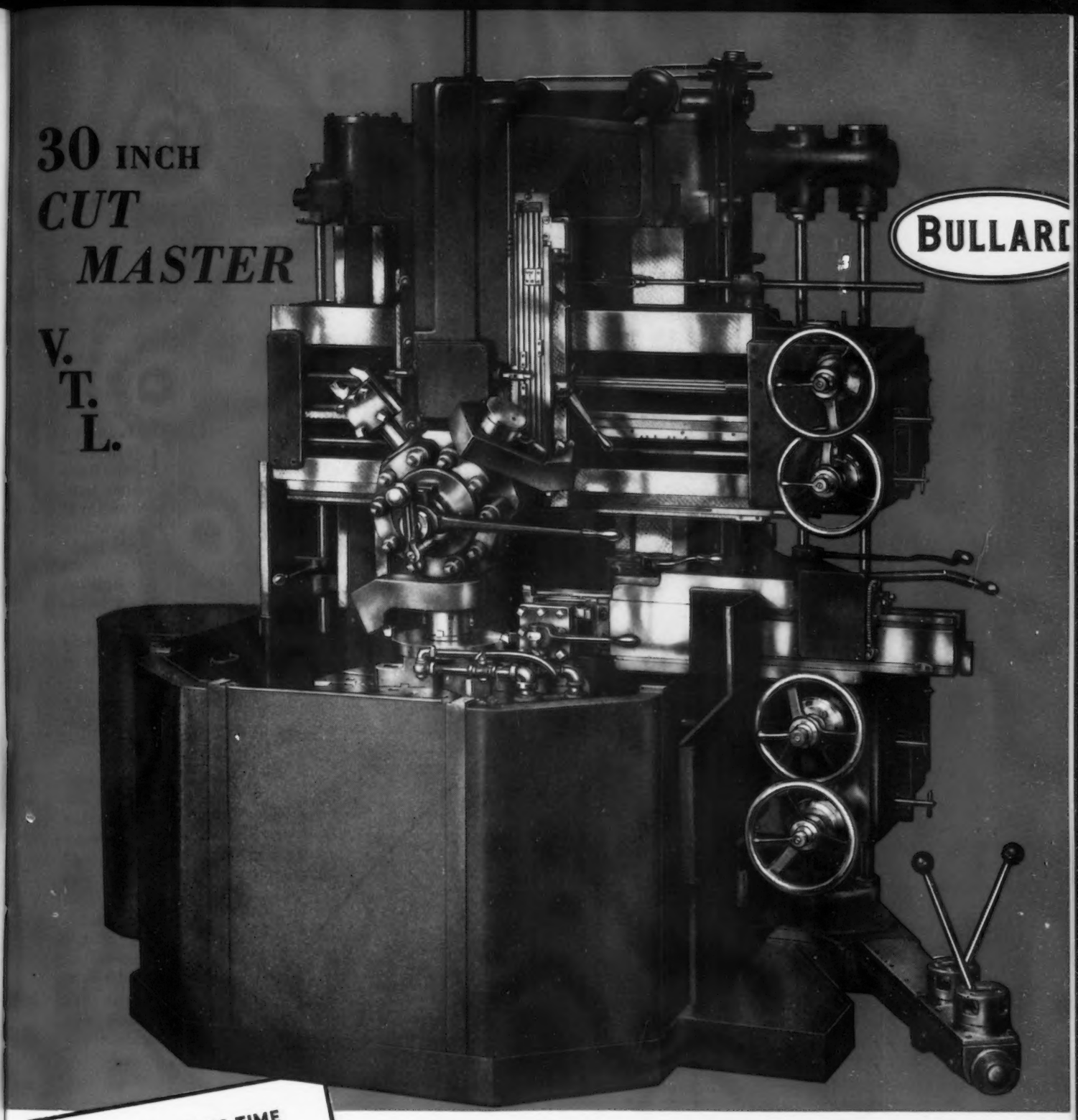
The most difficult cleanup situation in years is being faced by the industry as it tries to make estimates for final buying of materials and final releases of parts from suppliers' plants. The reported block in steel buying has not been removed in the past week, and it is almost impossible to predict exactly when auto manufacturers will be able to make their decisions on this point, since the last weeks of the 1940 programs appear to be shrouded in uncertainty. So far, Ford has not changed the position reported a week ago; the final steel buy is still pending. Chevrolet actually has retreated from an earlier position and has cut back on its estimated requirements for the immediate future. Others have held up final buys, although parts production (such as stamping operations and forgings, etc.) should be in the finale now.

Will Cut Off Bargain Shipments

BUYERS find it impossible in many cases to release specifications on the "bargain day" steel ordered before the first of the month. Steel companies promise to be adamant and say that they will cut off "bargain" shipments at the end of the quarter. Any further question of price stability seems to have been settled by the turn of events in international affairs and by the steep climb in domestic steel operations, automotive buyers concede.

As this is written, only Nash and Packard are known to have taken action to insure their initial requirements of steel for 1941 models. Others, to be sure, have inquiries pending, but action in some cases is known to have been delayed while quantity requirements are studied. In some quarters, a trimming of quantities is reported, but at the same time there is anxiety lest a shortage develop that might hold up shipments. Again, apprehension over the sales outlook, coupled with knowledge that large portions of plant capacity might be otherwise occupied,

30 INCH *CUT MASTER* V. T. L.



CUT MASTER CUTS TIME

16 feeds—.0026" to .500".
20 table speeds.
Sufficient power for carbide tools.
Power Traverse for both heads.

CUT MASTER ASSURES ACCURACY

Massive one-piece column and bed.
Heavy Timken Roller Bearing Spindle.
Main Head vertical and horizontal screw feed.
Positive Pressure Lubrication.
Inbuilt accuracy produces accuracy.

BALANCED ENGINEERING DESIGN

Gets Those Jobs Out Faster

Modern carbide tools impose new designing problems. One way Cut Master meets them is with pressure lubricated Timken Roller bearing spindle which permits the heaviest cuts easily and with assured accuracy. This and many other anti-friction bearings throughout the machine assure efficiency of input horsepower as well as smooth delivery of this power at the point of cutting. This smooth flow of power is delivered over the full range of twenty different table speeds.

Our new circular discusses the many other new features which place Cut Master to the front in the Vertical Turret Lathe field.

BRIDGEPORT THE BULLARD COMPANY CONNECTICUT

CUT MASTER

are the factors in the delay. Plants like Briggs (which builds Chrysler bodies) and the various suppliers of window moldings and other stampings, are unable to make any commitment until the major auto builders give the cue.

General Motors Shifts Personnel

AN important shift in executive personnel came last week with the naming of a new works manager at Cadillac-La Salle and a new general manager at the Detroit Transmission plant of General Motors Corp. The changes are indicative of a new intensity of action on the automatic transmission for several G.M. vehicles.

Announcement was made Saturday by Nicholas Dreystadt, Cadillac's general manager, that his veteran, Victor A. Olsen, works manager of Cadillac, had been assigned as general manager of the Detroit Transmission division after 21 years' service with Cadillac. His place will be taken by Clarence A. Raftrey, for the last six years assistant works manager. (See pictures in personal column, pages 100-101.)

The changes are regarded as a virtual reorganization of the Detroit Transmission plant, with much greater production volume as one of the goals. The Detroit Transmission plant now has a galaxy of production, engineering and executive talent, including G. A. Smith, recently named assistant general manager after transfer from the New Departure division; Vern Vansaw, formerly of Buick, plant superintendent, and Luke Beech, formerly of Packard processing department, who started Monday of this week as master mechanic.

SAE Program Revised

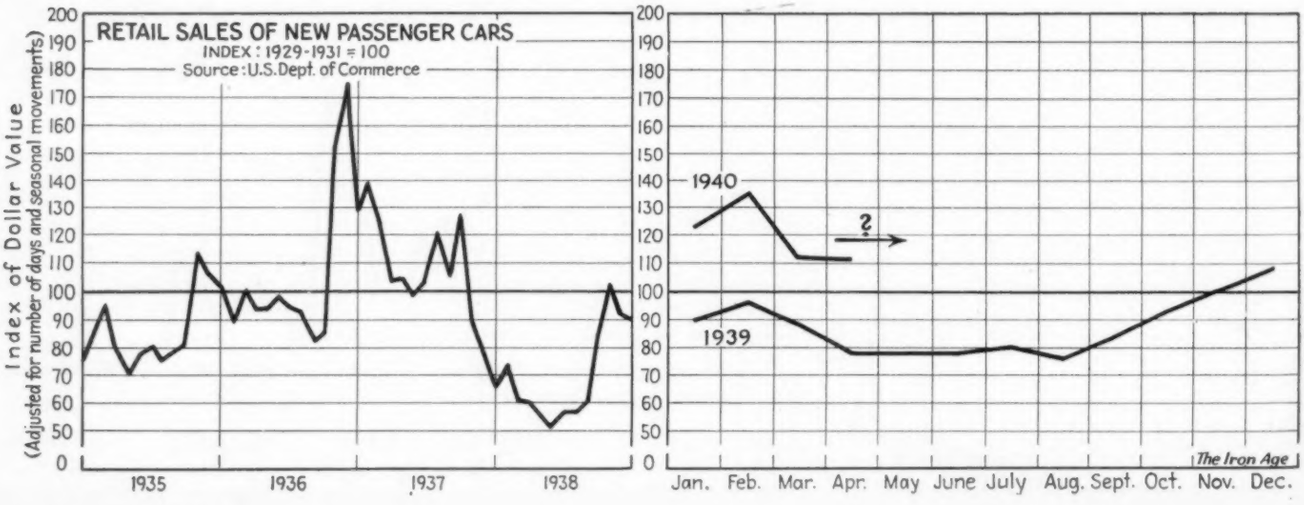
THE Society of Automotive Engineers has suddenly revised plans for its national summer meeting at White Sulphur Springs, W. Va. In its most important single meeting in a decade it will learn from official Washington sources the nature of the vital role it will be called upon to play in the defense program. According to an S.A.E. announcement, army participation in the sessions from June 9-14 has doubled the importance of the meeting. Lt. Col. Edward E. MacMorland, secretary, clearance committee, Army and Navy Munitions Board, will lead a group of military ordnance, Quartermaster Corps, aircraft and transportation officers just assigned by Assistant Secretary of War Louis Johnson to participate in the meeting.

An idea of the relative importance of used cars in the eyes of manufacturers of the new product may be gained from the fact that Chevrolet is just publishing this month a used car and truck reconditioning manual of 300 pages covering all makes of automobiles.

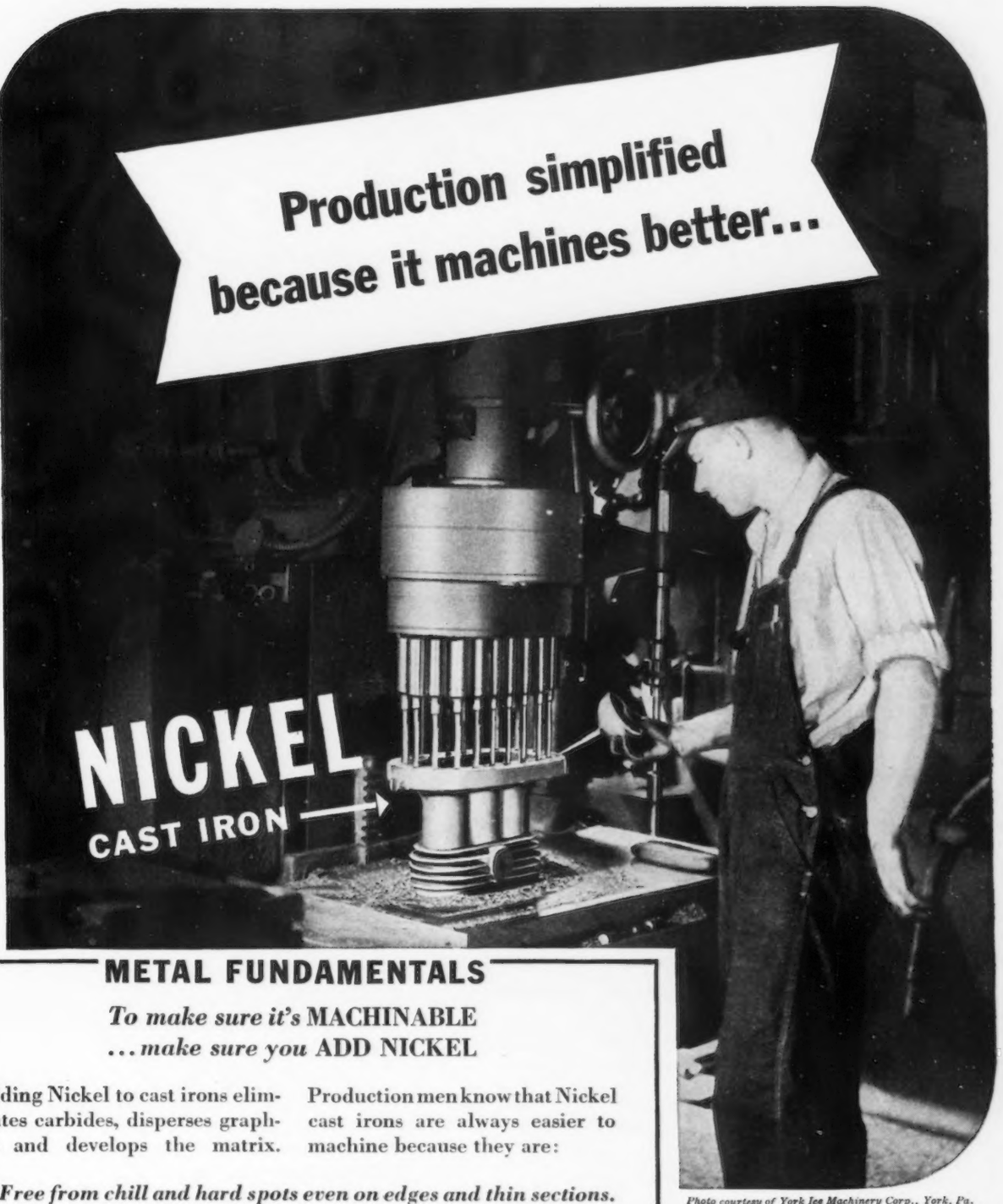
Revived by Cadillac-La Salle two years ago on its swank 60 special, two-tone coloring has become the current rage of the automobile industry with a substantial percentage of all 1940 shipments in two-color combinations. According to experience at the Fleetwood custom body plant which produces the majority of Cadillac-La Salle two-tone styles, special combinations such as these require 20 per cent more time than the conventional solid paint scheme. The practice still requires that the body make two trips through the drying oven, once after each separately applied color. Fleetwood employs a masking operation, painting the lower part of the body first, then masking this while the second color is applied.

Extruded Dowmetal safety blocks are being used in increasing numbers in auto plants, according to the Dow Chemical Co., Midland, Mich. Cast Dowmetal safety blocks have been used for several years but standardization into three sizes of extruded blocks has brought about lower cost and meanwhile the type of block has gained in popularity because of its light weight and great strength. One of the automobile plants worked with Dow in developing new blocks which, according to tests, are considerably stronger than oak and much lighter and easier to handle than either oak or steel.

. . . . **Charting a tide**—Early spring sales in the automobile markets had begun to exceed those of even the "good" year 1937, according to the U. S. Department of Commerce adjusted index. Latest figures (for April) became available on May 24 but they do not reflect the downswing which by this time was well underway. The course of the industry now is beset by considerable unresponsiveness in the retail customers' attitude and by possible restrictions if munitions production is placed in auto plants. Customer psychology, affected adversely now by war news, may reverse itself if war news becomes less discouraging.



Production simplified because it machines better...



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To make sure it's MACHINABLE
... make sure you ADD NICKEL

Adding Nickel to cast irons eliminates carbides, disperses graphite and develops the matrix. Production men know that Nickel cast irons are always easier to machine because they are:

1 *Free from chill and hard spots even on edges and thin sections.*

2 *Free from porosity, shrinkage and open grain that cause costly rejects during and after machining.*

3 *Dependably uniform in hardness and structure through thick and thin sections.*

4 *Of maximum machinable hardness.*

5 *Fine grained permitting mirror-smooth finish.*

Photo courtesy of York Ice Machinery Corp., York, Pa.

Producing cylinder blocks or other castings with sections of varying thickness, a manufacturer's first thought is machinability. From long experience, he depends upon Nickel alone or in balanced combination. He knows Nickel added to cast iron assures improved machinability and uniformity of structure, plus higher strength and wear resistance in finished parts.

• • •

Your consultation on applications involving Nickel alloyed irons is invited.

THE INTERNATIONAL NICKEL COMPANY, INC. **67 WALL STREET NEW YORK, N. Y.**

Washington

BY L. W. MOFFETT
Washington Editor

• Vinson bill, approved by House, substitutes negotiated contracts for competitive bidding, exempts naval orders from Walsh-Healey steel wage minimums. Lewis charges measure violates Roosevelt's pledge on labor standards

WASHINGTON — New Deal strategists of the national defense find themselves in quite a dilemma. They know that speeding up industrial production is a defense requisite, that relaxing present statutory "safeguards" for labor is in the wind, yet they find it politically expedient to make appeasement overtures to labor. War and Navy Department defense practitioners privately shake their heads when Administration lieutenants call for maintenance of present labor standards.

Much of the controversy surrounds the Walsh-Healey Public Contracts Act, stop-gap legislation which found its way to the statute books in 1936 after the Supreme Court condemned the NRA. The Walsh-Healey act, which requires adherence to prescribed labor standards for Government contractors, has been condemned by Army and Navy officials ever since. Its maximum hour, overtime, and penalty provisions have hampered purchasing programs, admittedly reducing competition on some industries; its effect has been to slow down all defense preparations, to put a greater cost burden on the Government.

In the steel industry, which is now subject to minimum wage requirements under the law for the first time, the Navy Department found that small companies in the industry do not bid to the extent they did before the law was enacted; that the tendency will be more and more in that direction now that minimum wage rates have been fixed and made effective in the industry.

Easing Walsh-Healey Act At Head of List

UNDER these circumstances, it was not surprising that Navy Department officials put relaxation of the Walsh-Healey act at the head of the list when they suggested ways for expediting naval shipbuilding when called before the House Naval Affairs Committee several weeks ago. In seeking ways for removing obstructions to the shipbuilding program, members of Congress learned that Congress itself was responsible for many of the hazards which are hamstringing progress.

As a result a bill by Chairman Carl Vinson was drafted on advice of the Navy and whipped through his committee. Last week it received House approval by a vote of 401 to 1. This is what the bill would do with respect to Walsh-Healey labor provisions:

The usual competitive bidding requirements would be discarded, giving way to a system of negotiated contracts. This has the effect of exempting all naval contracts from the Walsh-Healey act. The Vinson bill, however, includes certain labor provisions which, roughly speaking, adopt the maximum hour and overtime pay requirements of the Walsh-Healey law. In short, the effect of the measure would be to subject Government contractors in the steel industry to the present Walsh-Healey 40-hr. week requirements. Overtime would still have to be compensated at the rate of time and one-half. Minimum steel wage rates stipulated under the law, ranging from 45c. in the South to 62½c. in the Pittsburgh, Youngstown, Chicago and Eastern district, would not be required on naval contracts.

Irked by this provision, J. Metcalfe Walling, administrator of the Walsh-Healey Public Contracts Division, was understood this week to be leaving no stone unturned in an attempt to convince members of Congress that the "negotiated contracts" provision ought to be scuttled. Failing that, Mr. Walling was represented as desirous of administering the labor provisions of the Vinson bill.

Said Chairman Vinson shortly before his bill passed the House last week:

"I hope this House will bear in mind the objectives of this bill. The main objective is to cut red tape and to get down to the business of building ships. . . After two weeks' hearings the Committee on Naval Affairs brought in a bill that is technical in a great many details, and we are asking this House now to go on record whether it wants to do one of two things, and I use the word advisedly because it is correct—to let the clumsy fist of the administrator of the Walsh-Healey act to continue to impede shipbuilding or not?"

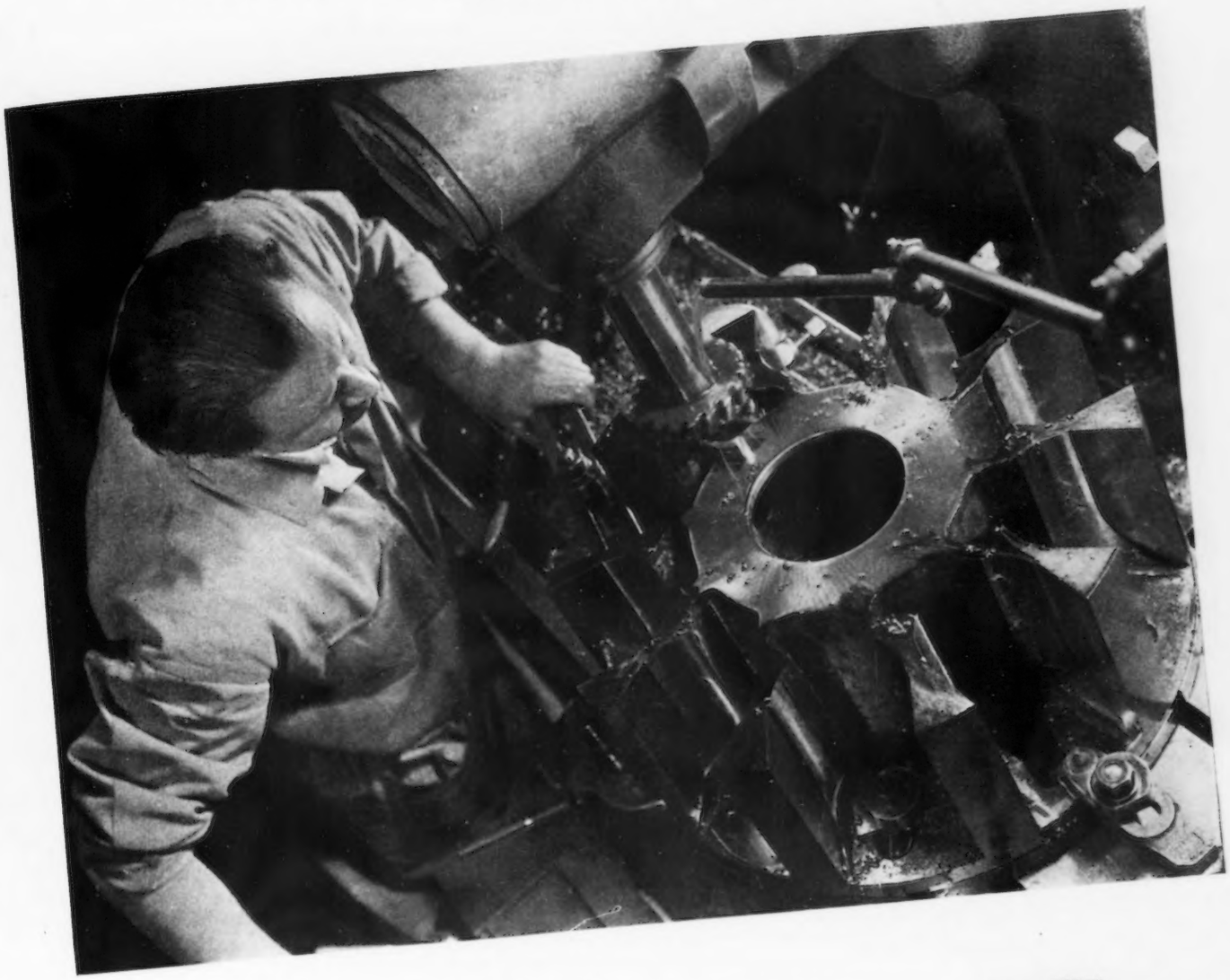
Unions Will See To Overtime Pay

CHARGING that Mr. Walling has been trying "to horn in" on the bill ever since its introduction, Mr. Vinson continued:

"He has been down to the Navy Department every day and has called my office time after time. I pointed out to him that there was not any suspension, as far as labor was concerned, by any provision of this bill against rights under the Walsh-Healey act. He said, 'You provide time and a half for overtime, but who is going to administer that?' He said, 'We want to administer it to see that the laboring man gets his time-and-a-half.'"

After advising the House that Mr. Walling wants to put the system of negotiated contracts under the

SECOND GUESSES ARE OUT... WHEN MILLING PARTS LIKE THIS



• Large intricate castings like the one shown above—a stainless steel intake valve for a vacuum packing machine—really bring out the versatility, accuracy, and maneuverability of a machine tool. Take the milling operations, for example. One little slip and hundreds of dollars worth of material and workmanship are wasted.

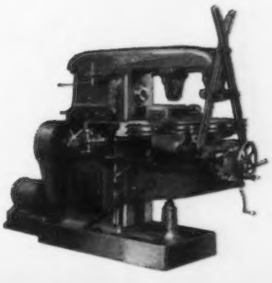
At the time the picture was taken, the operator was boring the pockets with a special milling cutter on a CINCINNATI No. 4 High Power Miller equipped with a Heavy Duty Vertical Attachment. Accuracy of these pockets must be right on the nose, or the vacuumizing process in the vacuum packing machine will be faulty, and profits will leak away rapidly.

No doubt the convenient controls which enable the operator to maneuver the work under the cutter had a lot to do with the selection of a CINCINNATI for such jobs. And then there's the inherent accuracy which means so much: the ability to take heavy cuts; rear controls for the jobs which hide the cutter; and many other profitable factors.

Write for catalog M-582 and get the whole story.

CINCINNATI

A SYMBOL OF A DEFINITE STANDARD OF WORTH



THE CINCINNATI MILLING MACHINE CO.

Cincinnati, Ohio, U. S. A.

Walsh-Healey law so that "the laboring man gets his time-and-a-half overtime," Chairman Vinson indicated that his committee had no plans to set up labor administrative machinery under the bill. "The law of self-preservation, one of the first laws of nature, will take care of that," he said. "Every union will see that every man who works overtime gets his time-and-a-half pay."

After Mr. Vinson's remarks, the House promptly shouted down an amendment proposed by Representative Arthur D. Healey, Democrat of Massachusetts and co-sponsor of the Walsh-Healey law, which would have subjected all contracts negotiated by the Navy to the provisions of the Walsh-Healey act.

The spotlight of the labor-defense controversy shifted to the Senate Naval Affairs Committee after John L. Lewis, CIO generalissimo, charged that two provisions of the House-approved Vinson bill are "in direct violation of President Roosevelt's pledge that labor standards will not be relaxed in the rearmament program."

In a letter to Chairman David I. Walsh, of the Naval Affairs Committee, the CIO chairman urged that the committee, which will next act on the Vinson measure, amend the bill so that safeguards under existing legislation are retained for workers employed by the Navy and private contractors. It was Senator Walsh who sponsored the Walsh-Healey law in the upper house in 1936.

The niche carved for labor in the defense program when President Roosevelt named Sidney Hillman, chairman of the CIO's Amalgamated Clothing Workers Union, to the President's seven-man national defense commission, will be worth watching as the Administration's rearmament plans unfold.

The President is known to regard Mr. Hillman as a compromise appointee, coming as close as any candidate could to the half-way mark between John L. Lewis and AFL President William Green, leaders in a rift that has kept organized labor in rival camps since 1935.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

WELL, IF YOU DON'T MIND, I'D SOONER YOU'D GIVE IT TO SOME GUY WITH A BIG FAMILY WHO NEEDS TH' DOUGH -- ME, I AIN'T MARRIED -- AND, WELL, I'M CONTENTED ON TH' OL' PLANER AND DON'T CARE FER RESPONSIBILITY AND DON'T THINK I COULD HANDLE MEN-
YE GODS! TURNIN' DOWN A FOREMAN'S JOB! WHY, TH' GUY MUST BE NUTS!
YEH, LIKE A FOX! THAT'S TH' HEIGHT OF INTELLIGENCE -- HE KNOWS IF HE AIN'T A FOREMAN HE WON'T BE STRUGGLIN' T'BE SUPERINTENDENT -- HE'S ONE MAN WHO'S REACHED UTOPIA AND HAS SENSE ENOUGH TO KNOW IT!
J.R.WILLIAMS
HAPPINESS
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5-31

Vinson Ship Measure

The Vinson bill to expedite the naval shipbuilding program was passed by the House on Tuesday by a vote of 400 to 1 and provides for:

1. An advance to contractors of not more than 30 per cent of the contract price if deemed necessary in the best interests of national defense by the President, who would be authorized to prescribe terms and require adequate security.

2. Negotiation of contracts without competition provided prices are deemed to be fair and reasonable; and vesting authority in the President to give Navy machine tool orders priority over all orders for export.

3. Exemption from the profit limitation provisions of the Vinson-Tramell Act of all contracts or subcontracts where the award exceeds $25,000.

4. Discretionary power vested in the Secretary of the Navy to determine the necessity and the cost, including the proportion to be charged against a particular contract, of additional equipment and facilities required to speed up the naval shipbuilding program.

5. Five-day week or an 8-hr. day and 40-hr. per week, with time and one-half for overtime for employees of Navy Yards, of private contracts and sub-contractors working on naval contracts, except that the hours shall not exceed 48 per week unless declared to be necessary by the President.

Forged Steel Balls Dutiable

The United States Court of Customs and Patent Appeals has affirmed a ruling of the United States Customs Court which held that forged steel balls were dutiable 27½ per cent as machine parts. Steel, Inc., the importer, had protested that they were properly dutiable at 25 per cent as forgings of steel. The Court of Customs and Patent Appeals reversed a Customs Court ruling which had sustained a protest that certain machines were properly dutiable at 25 per cent as bookbinding machinery. The machinery, which was imported by Charles Bashwiner, Nunham & Reeve, Inc., had been assessed at 27½ per cent as machines "n.s.p.f."

Carboloy Wheel Dresser Saves 18c Per Dressing

Users of diamond dressers have found that the Carboloy diamond-impregnated wheel dresser permits the use of diamonds for dressing grinding wheels but eliminates many unfavorable factors commonly encountered in the use of ordinary, single-diamond dressers.

On one application reported, a saving of 18c per dressing was made with a Carboloy wheel dresser. The job was dry dressing a 20 x 6 aluminous oxide wheel used for rough grinding laminated steel cores of electric motors. The diamond-impregnated Carboloy dresser replaced a 3 carat diamond and reduced the cost from 21½c to 3½c per dressing.

Carboloy dressers give greater diamond usage per carat, eliminate all remounting expense, stand abuse, and save at least 25% in dresser costs. Used for rough, semi-finish, and finish dressing operations. Send for catalog DR-38.

Carboloy Dies Extrude 215,000 Feet of Abrasive Resistor Dough

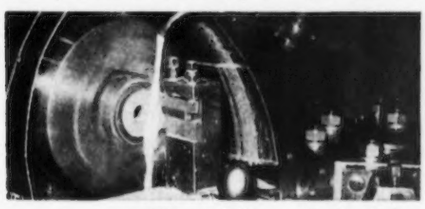
This application of Carboloy cemented carbide to resistor extruding dies is indicative of the high wear resistant qualities of this metal when applied to parts on machines subject to localized abrasive wear.

On this application Carboloy dies extrude about 215,000 lineal feet of stiff, abrasive, resistor dough, out-wearing 215 hardened steel dies, whose life averaged 1,000 feet of this material.

This is a small part of the overall saving, however, as the operator now puts in all his time doing productive work instead of changing two steel dies during each batch. Moreover, the quality of production is better because of better control of diameters, and closer control of production.

40% of All Carboloy Jobs At DeWalt Are Steel Cutting

Typical of the general purpose use of Carboloy tools in the DeWalt Products Corporation, Lancaster, Pa., is this facing of a steel plate arbor collar. Operating at 381 feet



per minute, .065" feed, ⅛" cut, the Carboloy tool used stands up for the lot of 250 pieces and is still in good condition. 40% of all Carboloy operations at DeWalt are on steel. Through the carefully planned, general-purpose use of Carboloy, DeWalt have successfully applied this cutting material to 80% of all machining operations in their plant.

☆ Again! . . . General purpose use of Carboloy Tools on Small-lot diversified work . . . PAYS DIVIDENDS!

DeWalt Did it!

And STEPPED-UP MACHINING PRODUCTION 65%

DeWalt Products Corp., Lancaster, Pa. Producers of "Flexible - power" Woodworking Machines and other cutting equipment.

Machine shops seeking a practical way to apply Carboloy tools broadly on small-lot, diversified work will find useful the method employed by DeWalt Products Corporation, Lancaster, Pa., on this type of machining work.

In machining the parts for DeWalt high speed cutting equipment for wood, metal, stone, etc., lots range from 20 to 100 pieces, metals machined are cast iron, semi-steel, and aluminum. To apply Carboloy tools profitably on such limited-quantity work, it is usually necessary that each tool be designed for wide application.

To meet this requirement, the DeWalt tool supervisor reviewed a typical cross-section of the machining work passing through the shop, particularly noted frequency with which similar machining operations occurred. From this study, 6 general purpose Carboloy tools were designed to do the bulk of the work. Problem of carbide grade selection was simplified by using one general purpose grade for cast iron, one for steel.

Here's How—
6 general purpose styles of tools, using 2 general purpose Carboloy grades do bulk of work in DeWalt plant.

Starting with this basic procedure, Carboloy general purpose tools have been applied to approximately 80% of all jobs in the shop. 40% are on steel; 60% on cast iron and aluminum. It has resulted in a 65% average increase machining production, according to C. L. Boughter, Supt.

CARBOLOY COMPANY, INC., 11153 E. 8-Mile Ave., DETROIT, MICHIGAN

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TUNGSTEN CARBIDE—TANTALUM CARBIDE—TITANIUM CARBIDE

FOR CUTTING, DRAWING, SHAPING, EXTRUDING METALS AND NON-METALLICS
★ FOR REDUCING WEAR ON EQUIPMENT OR PRODUCTS YOU USE OR MAKE ★

News of Industry . . .

Jones & Lamson Machine Plant is Expanded Again

• • • **Jones & Lamson** Machine Co., Springfield, Vt., will increase floor space at its plant by 21,000 sq. ft. in an extension of its assembly lines, and building of a new shipping room and new paint room. Sixty thousand sq. ft. will have been added to the Jones & Lamson plant during the last 12 months, John C. Price, chief sales engineer, reports.

Jessop Steel Develops Cold Heading Die Steel

• • • **Steel for cold heading dies,** made by an improved process which eliminates the porous center of the cast ingots and thus insures a sound steel capable of long tool life, has been developed by the Jessop Steel Co., 537 Green Street, Washington, Pa. It is made from electric-furnace steel, the grain size of which is carefully controlled so as to permit wide variation in hardening temperature without coarsening. Experience has shown that a shallow hardening penetration is best for small dies, while a deeper penetration is better for large dies. Variations in penetration can thus be safely effected through variations in hardening temperature. This Jessop cold heading die steel can be used in either solid or open die cold heading work.

Steel Payrolls Taper to $67,724,000 During April

• • • **Payrolls of the** steel industry amounted to $67,724,000 during April, slightly below the March total of $68,768,000, but considerably ahead of the total for April, 1939, when steel payrolls totaled $58,517,000, according to the American Iron and Steel Institute.

The number employed in the industry averaged 503,000 in April, against 514,000 in March and 452,000 in April, 1939. Wage earning employees earned an average of 83.6c. an hour in April, as in March, compared with 82.9c. an hour in April, 1939.

An average of 33.4 hr. was worked per week by wage earners in April, 32.3 hr. in March, and 32.1 hr. in April, 1939.

Standard Steel Spring Buys Indiana Company

Pittsburgh

• • • **Standard Steel Spring Co.,** with plants at Coraopolis, Pa., Allegan, Mich., and Gary, Ind., is purchasing outstanding capital stock of the Muehlhausen Spring Corp., Logansport, Ind, makers of all types of coil springs. Total purchase price is $1,359,500, of which $100,000 has already been paid, with the balance to be paid on or before Aug. 10, 1940. Standard Steel stockholders will vote on the proposed incurred indebtedness July 30. Standard Steel plans to borrow a sum not exceeding $1,250,000 in the form of a promissory note with additional funds for the deal to be paid out of the company's cash reserve.

Steel Used Per Family up 70%

• • • **Approximately 2295** lb. of finished steel was used for each American family in 1939, the American Iron and Steel Institute estimates. This figure was almost 70 per cent more than the total for 1938 but substantially below 1937, 1929 and several other years.

Final data for 1938 indicated that about 1375 lb. of finished steel was consumed per American family that year, compared with 2440 lb. in 1937 and 2950 in 1929. Consumption per family over the decade just closed, despite the effects of the depression, was close to 10 per cent above the average from 1900 through 1909.

Ford Will Start "Henry" Furnace Relining June 1

Detroit

• • • **Ford Motor Co.** will begin relining and modernizing of its "Henry" blast furnace at the River Rouge plant on June 15. The furnace has been in operation continuously for six and one-half years. The reconstruction work will be done by Arthur G. McKee & Co., Cleveland, and is scheduled to be completed Aug. 23.

Construction Awards Spurt to New Peak

• • • **Contracts for heavy** construction projects awarded in the past week amounted to $78,575,000, the highest weekly total recorded this year and 97 per cent above the corresponding week of a year ago. The increase, according to *Engineering News-Record* reports, was due largely to the expansion of airplane manufacturing and storing facilities at three points and the awarding of contracts covering Coulter Shoals dam in Tennessee.

Private contracts awarded in the week totaled $18,304,000, while public contracts were $60,271,000. These totals represent increases, as compared with the corresponding week of 1939, of 329 and 69 per cent respectively.

Value of private contracts awarded thus far in the current year are 17 per cent above the comparable period of 1939, while public contracts are 26 per cent lower.

W. F. Gammeter Co., of Cadiz, Ohio, Builds New Factory

• • • **W. F. Gammeter Co.,** Cadiz, Ohio, manufacturer of steel calendar stock shells, radiator cabinets and other products, are completing a new 180 x 70 ft. factory building of brick and steel construction, W. F. Gammeter, president, announced.

Labor Shortage Holds up 7-Day Week in Canada

Toronto

• • • **Canadian Government** and industrial leaders are centering attention toward building up Canadian industry to take care of the increasing demands for war supplies and materials. At the request of the Federal Government, companies engaged in the production of munitions are making efforts to put their plants on 24-hr. day, seven-day week production basis. However, the actual achievement of this plan is being held up owing to lack of sufficient skilled labor. Until this difficulty has been overcome the full time continuous production rate will be delayed.

Officials of the Department of Munitions and Supply, Ottawa, announced that work has started on installation of equipment and extension of plant facilities to increase substantially both the quantity and type of shells manufactured in Canada. At present eight Canadian plants are engaged in the manufacture of 2,250,000 shells. Additional shell orders now being placed will add five or six to the number of plants producing shells and increase the output to 4,500,000 shells.

Some 60 plants in Canada are engaged in the manufacture of cartridge cases, fuses, primers and other requisites. Excluding explosives orders—for which the capacity of the Dominion is being rapidly increased—contracts totaling more than $40,000,000 have been placed for munitions, which include 100,000,000 rounds of small arms ammunition, individual gun barrels, anti-tank carriages and other items. Approximately another $30,000,000 is being or will be expended on enlarging the capacity of the explosives plants of Canada.

An order-in-council has been passed by the Government giving the Department of Munitions and Supply blanket authority in the purchase of war requirements. Included in the authority is permission to purchase materials and supplies without public tender, when it is considered necessary in the public interest.

Heavy four-motored bombers are to be built near Toronto, according to plans laid down by the Federal Air Ministry in co-operation with the Ontario Government. The machines will be the largest ever constructed in Canada, and the engines will be supplied from England. The move is part of the speed-up plan for aircraft production and will require considerable expansion of aircraft plants, which will be proceeded with immediately.

Announcement is made from Ottawa that the British Air Ministry has placed an order with the Link Mfg. Co., Gananoque, Ont., for Link trainer planes to the value of $1,500,000.

Dominion Foundries & Steel, Ltd., Hamilton, Ont., is making progress with its plant enlargement program to cost $750,000, which is the final unit of a $2,500,000 improvement campaign started about five years ago. Works completed include replacement of old office structure with new brick building doubling size and the addition to the cold rolled mill and installation of a four-high temper mill. Under construction are a second hot mill in the plate department, erection of power house for plate mill, addition to main foundry to provide room for new forging plant for war work and to accommodate a 65-ton open hearth furnace.

Coming Meetings

June 6 and 7—Grinding Wheel Manufacturers Association and Abrasive Grain Association, Niagara Falls, N. Y.

June 9 to 14—Society of Automotive Engineers summer meeting, White Sulphur Springs, W. Va.

June 17 to 20—American Society of Mechanical Engineers, semi-annual meeting, Milwaukee.

June 24 to 28—American Society for Testing Materials, 43rd annual meeting, Atlantic City, N. J.

Sept. 24 to 27—Association of Iron and Steel Engineers meeting and exhibition, Chicago.

Oct. 2 to 5—Electrochemical Society, Ottawa, Canada.

Oct. 21 to 25—National Metal Congress, Cleveland.

Detroit Tool, Die Shops Ready For Defense Work

Detroit

• • • **Large portions** of tool and die shop capacity will become available progressively through June, July and August to take care of required aviation and other defense work for the Government.

Automotive programs for 1940 are 80 to 90 per cent complete and many of the tool and die shops here have already taken on work from the aviation industry, principally from airplane engine builders whose requirements for tools, jigs, fixtures and gages have been an important item in Detroit shops for several months. Eastern tool and die shops apparently became overcrowded with such work before Jan. 1

Contrary to widespread newspaper and radio reports, 1941 models will be introduced according to schedule in the fall. The Automobile Show is still scheduled for Oct. 12-20. Barring unforeseen events, the industry will close its 1940 run in July and will have some of the new models ready as early as mid-August, it is anticipated. Reports that 1941 models would be cancelled are attributed to persons not familiar with automotive scheduling.

Prospects that 1942 models, however, will be delayed or will be duplicates of 1941 models do exist. It is far too early for the industry to make any such decision, however, and any such action would naturally depend on the extent of military work in Detroit shops and the programs laid down in Washington.

Structural Steel Orders Are Halved in April

• • • **American Institute** of Steel Construction reports orders for fabricated structural steel in April declined to 63,506 tons from 128,321 tons in March and 118,309 tons in April, 1939. April shipments totaled 102,916 tons against 95,915 tons in March and 120,943 tons in April, 1939. Tonnage available for future fabrication at the close of April totaled 363,204 tons.

New Dealers Slow Industry's Drive To Give U. S. Adequate Defense

Washington

• • • **At a time when** Government-industry unity is sought in the name of national defense, employers find their perplexities being increased rather than decreased as the Administration feverishly sets the stage for military preparedness, which it and preceding administrations so sadly neglected.

While the New Deal has apparently declared a partial rather than a permanent armistice on kicking business about, it is stoutly refusing to accede to other than minor relaxation in labor laws, leaving industry in a quandary on how it can comply with the demand for full speed ahead on the belated defense program.

Restriction also is being enforced against free cooperation by insistence of the uninformed New Deal on assuming full direction of policies on both broad and technical industrial problems of mobilization. It reflects a jealousy that is childish in its emotional quality lest it be "superseded" by commissions and boards it sets up. Pains are taken to see to it that its "inner circle" is represented on them as a guard against any retardant affecting "social gains" of the past seven years of which self-praise permeates the air in every fireside chat.

New Deal laudation in these chats and messages has led to a widespread opinion that the third term campaign definitely has been launched, an important impediment to cooperation and non-partisanship which are being properly urged but which cannot be a one-sided performance.

It would be helpful in promoting this spirit and in pushing the preparedness program if heed were given to pleas by industry as well as national defense agencies of the Government for a common sense rule in application of these social laws—such as labor laws, whose rigidity under emergency conditions will become increasingly clear and serious as industry proceeds with its national defense work.

That labor is entitled to a good wage and reasonable hours, under emergency as well as normal conditions, is a matter of course. Yet it also should be called upon to give. But the situation has developed where it seems that there is one law for industry and another for labor.

High authority exists for this observation. No less a person than the Chief Justice of the United States in effect has said as much. He did so in his vigorous dissent in the 6-3 decision in the Apex Hosiery Co. case wherein unsuccessful effort was made by the company to recover triple damages under the Sherman anti-trust act.

The majority, in an opinion delivered by Mr. Justice Stone, said the law was not applicable to what the Circuit Court of Appeals had said was a "sit-down strike in its most aggravated and illegal form." As pointed out by Chief Justice Hughes, when the union (CIO) demanded a closed shop agreement and, on its refusal, declared the strike, only eight of the company's 2500 employees were members of the union. The company's plant was seized and held for several weeks, the Chief Justice explained, and its machinery and equipment were "wantonly demolished or damaged to the extent of many thousands of dollars."

The Supreme Court, the Chief Justice said, in the course of citations, has pointed to the protective exercise of congressional power under the Sherman act as not in any way restricted because the volume of the commerce involved in such (interstate) transportation was small. In the Apex case some $640,000 in goods was held up from interstate shipment.

GERMANS USE LACQUER AND WELDING TO MAKE PACKERS CANS

• • • **The use of a lacquer** in place of tin coating in the manufacture of cans for preserving meat and vegetables is reported in a recent issue of the German publication *Deutsche Bergwerks Zeitung.*

The process, inspired by Germany's lack of adequate tin supplies, is reported to combine both welding and "bonding" and is already in operation in a German packing plant.

Plain strip of Thomas quality is used in place of the Martin quality steel usually employed for tin plate. The Thomas steel used is also of thinner gage than the Martin steel previously used.

Tops, bottoms and seams are joined by welding in automatic machines having the same production capacity as the usual soldering machines. Welding is said to result in a saving of 2 per cent in steel requirements, as well as eliminating the need of tin and lead.

The tops and bottoms of the cans are stamped out in the usual fashion. The bottoms, tops and bodies are then subjected to an anti-rust bonding (phosphating) process developed by Metallgesellschaft A.G. Two to three minutes are required to apply a uniform coating of phosphate.

In this bonding process the cans go through a degreasing zone using alkalies, two intermediate zones, the bonding bath and finally the drying zone. About 30 minutes are required to complete this treatment. Under another process, the bottom is attached to the can before bonding.

The bonded pieces then are passed through a lacquer bath using a special lacquer, the nature of which is not divulged. After this bath, the cans are assembled and ready for use.

These cans are reported to have proved very successful for preserving meat and vegetables, but it is indicated that they cannot be used for foods with acid content, as certain fruit. Experiments are being conducted with plastic-type lacquers with the view of developing a coating suitable for acid foods.

Latest Defense Plan Costs Will Top 4 Billions

Washington

• • • With the tentative adjournment date of Congress advanced by three weeks to July 1, military, naval affairs and appropriation committees in Congress this week were piecing together President Roosevelt's latest request for over a billion dollars with his original defense proposal advanced on May 16, which brings the total contemplated by the program close to $4,500,000,000 in appropriations and authorizations.

Mr. Roosevelt's latest request, sent to Congress last Friday, characterized events in Europe through the use of aviation and mechanized equipment as "incredible" and warned against possible consequences of further developments. He specifically asked that the additional appropriations be authorized before the adjournment of Congress.

The Presidential message was vague, leaving most of the details of the supplemental program to be worked out between Army, Navy and Congressional representatives, but Mr. Roosevelt emphasized that modern defense requires the support of highly developed machinery of the country's productive capacity and calls for the training of large numbers of mechanical and manual workers.

There were reports, however, that War Department plans under the supplemental request call for the placing of immediate orders for 2800 bombing and pursuit planes, larger quantities of anti-tank and anti-aircraft guns, 1700 tanks, 500 heavy artillery units, and other weapons understood to be beyond the development stage but not yet in actual production.

An investigation into manufacturing resources "since my message of May 16 to determine the practicability of placing additional orders with industry for special material, both to provide an early expansion of existing production facilities, and to obtain increased quantities of the special weapons concerned, has caused the War and Navy Departments to submit to me an urgent and new recommendation that increased appropriations and authorizations for the national defense be made before the adjournment of the present Congress," the President said.

"Over and beyond the acquisition of this actual material is the evident requirement for the immediate creation of additional production facilities to meet possible future emergencies as well as present deficiencies in the making of munitions, such as guns, ammunition and fire control equipment. These facilities require a long time to create and to reach quantity production.

CIO Strikes Threaten G-M, U. S. Steel Plants

• • • **United States Steel** Corp. and General Motors Corp., both represented on the 7-member National Defense Advisory Commission set up by President Roosevelt, this week found themselves threatened by CIO strikes.

General Motors, whose president, William S. Knudsen, has discussed the possibility that his company may be able to make 1000 war planes monthly, found its counter-proposals for a new CIO-UAW contract covering 135,000 workers rejected by CIO leaders. The corporation had refused a general wage advance and other concessions sought by the union. The UAW telegraphed the President for "immediate intercession" by the Federal Government. Union members have been asked to authorize a strike or other action.

Striking employees of the Federal Shipbuilding & Dry Dock Co., a U. S. Steel subsidiary, returned to work June 3 after three days' idleness at the Kearny, N. J., yards where a total of six cruisers and destroyers are being built for the Government. The shipbuilding company granted wage increases of 2½ to 4½c. an hour for 6700 employees but delayed action on other proposals, including a greater pay increase, one week's vacation with pay after a year's service and a union shop. Said L. H. Korndorff, Federal Shipbuilding president:

"The company and the men in the yard have been speeding ahead the national defense program and there are two naval destroyers now preparing for sea trials as well as four other destroyers and cruisers which will be delayed in completion. . . . So far as the statement that the company now receives higher prices for ships than two years ago is concerned, it must be pointed out that such a statement does not take into consideration far reaching changes in design nor does it recognize that all contracts now in the yard have been awarded on a basis of competitive bidding."

Shells in a plant somewhere in the U. S. . . . Instead of products for peace many American factories soon will be making products for war.

Emphasis on Tanks, Planes Revises M-Day Plans for Detroit Industry

Detroit

• • • **Three principal** demands will be made on Detroit industry and its assembly lines in carrying out the nation's new defense plans. For at least two years now civilian industrial leaders and military mobilization experts have been actively gearing the auto plants and affiliated industries to help meet this trio of demands—for mobility, firing power and aviation which have proved to be a winning combination in the European conflict.

Behind William S. Knudsen in his new post as national production chief for defense there is an important backlog of knowledge and experience in the form of possibly thousands of manufacturing executives in hundreds of plants already familiarized with War Department requirements through the educational orders program which has been carried out. There may now be some necessary rearranging of plans, particularly because of the greater emphasis on tanks and airplanes, but the background knowledge and specialized experience, plus considerable tooling, still exist in usable form.

M-day planning for this area, under Alex Dow, chairman of Detroit Edison Co. and civilian chief for industrial mobilization, has concerned itself with lining up sources of supply for the three basic sets of requirements which the Detroit area seemed best suited to produce. These were mobile units, such as trucks, scout cars, artillery bogie and limber units and trailers; ordnance, particularly 75 mm. shells, which will be produced in large quantities here, anti-aircraft projectiles and recoil mechanisms, fuses and machine guns; and, finally, aircraft parts and accessories. The latter, at least, appears now to be subject to partial or complete replanning, with the goal of turning out large numbers of airplane engines here.

Most readers are familiar with the planning for mobilization which has been carried on in industrial areas by regular Army men working with a district civilian chief and his civilian aides. Offices have been established in Detroit to handle separately the problems of planning vehicle procurement (QMC), ordnance procurement and aviation procurement.

These officers surveyed and studied the industrial scene, made plans, sought voluntary industrial cooperation, and laid the groundwork for proposals which eventually resulted in the placing of educational orders. Finally, they have obtained from about 400 Michigan manufacturing plants signatures on tentative production schedules for the oft-mentioned M-day. Without doubt, these schedules will presently bear fruit. When that time comes, the nation will find that the ways are greased for the production of unlimited numbers of trucks, scout cars and other automotive equipment and that tools, dies, jigs, fixtures and gages are available for at least a substantial number of the ordnance and aircraft requirements.

Production of trucks and similar vehicles for the QMC will be no problem for the industry, nor will any prospective order of that sort be so large as to interfere with regular operation of assembly lines for commercial purposes. (However, other projects undoubtedly will use up to 50 per cent of auto plant capacity). Design differences from commercial vehicles are relatively unimportant and are thoroughly understood in the plants now because they have just produced about 19,000 vehicles under a $22,000,000 budget. Expenditure of $50,000,000 to $89,000,000 (figures which seem to be top limits under consideration now for mobile equipment) would not buy more than 90,000 vehicles at most, and this number will not strain the industry capacity. The only possible bottleneck has been the production of multiple drive units (four- and six-wheelers) and there is assurance that if special axle plants operate three shifts a day they can supply all that will be needed.

There is little prospect that tanks will roll off Detroit's assembly lines. Contrary to popular notions, military tanks simply are not the equivalent of flivvers, nor even of tractors. The tank does not lend itself, production men point out, to the progressive assembly line, except in a limited way. Mostly, it requires a huge fabricating shop for its manufacture, with heavy jigs and framework to hold it during construction and almost until the time when it is ready to be operated. The reason is obvious when the very nature of the steel monster is considered. Its body (technically known as the "hull") is welded and riveted armor plate, and is more likely to be the product of a shipyard or steel fabricating plant than an automobile factory. Actually, orders so far placed appear to have been with producers of railway rolling stock.

IF GERMANY WINS the war, the airplane and tank factories far behind the battle lines will have contributed heavily to the outcome. This photograph, showing the interior of a German tank plant, is one of the most unusual pictures, from an industrial viewpoint, to come from the Reich since the war began. In plants like this were built the thousands of fighting tanks which have raced across France and the low countries. *Interphoto*

The tank power plant is not of the automotive type, although there are possibilities in that direction, it is conceded. One engine to which military attention is known to have been paid is a specially "suped up" Buick which delivered enough extra power to drive a car about 20 miles an hour past its best previous speed. Power required is far outside the usual range of automobile practice, however. Currently, light tank engines are reported to deliver about 300 hp. Continental, at Muskegon,

Mich., has been building some 300 airplane type engines, rated at 280 hp., of which about 150 are believed to be for tanks. General Motors has built one special diesel delivering about 300 hp. for use in a tank. The 310-hp. Guiberson diesel aircraft engine which the Buda Co. is making at Harvey, Ill., is also intended for tank use in a modified form. Present practice definitely favors the use of the airplane type engine in tanks because it is powerful, light, compact and can be mounted unconventionally in the tail end of the hull. It is considered probable that power up to 1000 hp. will be needed if 80 or 100 ton tanks are part of the program.

Heavy-duty clutches are required in tanks, and they are subjected to extreme service in the field. One source has pointed to the advantages in using the hydraulic coupling or fluid flywheel which Detroit is now tooling up to produce in very large quantities for automobile use. Also, some huge rubber doughnut type of coupling has been used with success, and production facilities for this sort of unit exist in Detroit and the rubber producing cities.

The caterpillar crawling mechanism is more the product of a tractor plant than an auto plant, although these parts could be made in Detroit if required.

It is doubtful, however, that Detroit will become a producer of tanks, according to authentic information here.

The whole problem of mass production of airplane engines has been thrown open by developments of recent weeks. A month back, it was the general opinion in the automobile engine industry that local plants and methods would not fit at all into the picture as aviation experts would desire them. That is why automotive leaders have been generally cautious about the prospects of their producing aviation engines here.

A revolution in shop practice or in accuracy specifications will be required before large numbers of airplane engines can be produced —either here or in present aircraft engine plans. It is not a question merely of accuracy or of tolerances, for automotive practice requires accuracy. Instead it is a question of making selective fits. Present aircraft practice is to work to an exact dimension, within a tolerance, and insist on having all parts conform exactly to specifications so parts are completely interchangeable. Aircraft pistons, cylinders, and wrist pins, for instance, are finished "right on the nose." The general automotive practice is a departure from this—and the departure is really a vital part of the system and technique upon which the industry's mass production is built.

The auto industry sanctions the use of selective fits. Parts are machined to a specific dimension, but those which are not "on the nose" are segregated, perhaps by tenths of thousands of an inch, into four or five groups which are then matched up with mating parts so the final fits meet certain specifications. Thus "oversize" wrist pins go into "oversize" holes, but the fit is within limits just as close as those gained by the aircraft industry in a more costly manner. Given chance to use such a system of selective fits, auto men believe that they could produce airplane engines faster and cheaper than is being done now. Without such a system, few would care to try the job of putting the air industry on a mass production basis.

Another unusual practice of the aircraft industry is the polishing of parts over all surfaces, not just working surfaces. This is done to help detect siges of incipient failure and to remove possible lines of local stress concentration. Automotive men hesitate to argue a point of safety, but say that they would rely more generally on modern test methods and eliminate the time-consuming polishing operations.

If airplane engine production is placed in the hands of automotive production men, as suggested, the program will necessarily involve modifications along these lines.

Should the auto plants turn attention to the aviation engine, 50,000 a year would be a relatively small number, and tank requirements could be added without upping the total much, and that is regarded as the probable course of events in the near future. It presupposes that plane engine designs and requirements will be standardized and substantial quantities of various types ordered.

Numerous inquiries from automotive suppliers indicate that there is considerable interest in learning more about their status under the proposed program. In general, it can be said that their orders will follow the placing of work with first line suppliers. Considerable care has already been exercised in the planning to avoid dislocations between the first-line suppliersand their regular sources. It has been emphasized that such secondary sources, while subject to Army approval, are the responsibility of the principal contractors. In the filling of most educational orders, bidders made use of their regular, time-tested sources of supply for parts and sub-assemblies. Thus the secondary source was trained at the same time that the winner of the order learned how to produce the required military goods.

War Pledge by NAM Opposes Profiteering

• • • **Directors of the** National Association of Manufacturers have made this pledge for American industry:

"Industry recognizes the gravity of the defense problem which faces the nation and the demands which will be made upon the skill and capacity of industry. It recognizes that the situation calls for the full power of America's genius in industrial management and mass production.

The National Association of Manufacturers pledges the knowledge and experience and the utmost energy of its members to the task ahead.

It commits itself to this effort, abhorring war and urging every possible effort to avoid it compatible with the national honor and safety.

It pledges continued opposition to profiteering. No man or group should use the national emergency to serve his or its selfish ends.

Defense Advisory Board Offices Are Established

Washington

• • • **Establishing offices** in the privately-owned Federal Reserve Board building the seven-member National Defense Advisory Commission has started its task of mobilizing industry. Edward R. Stettinius, Jr., chairman of the United States Steel Corp., is in charge of "raw material" production, President William S. Knudsen of the General Motors Corp. will direct "fabrication" of the materials into the finished product and Chairman Ralph Budd of the Chicago, Burlington & Quincy Railroad will direct transportation of all materials for the war machine.

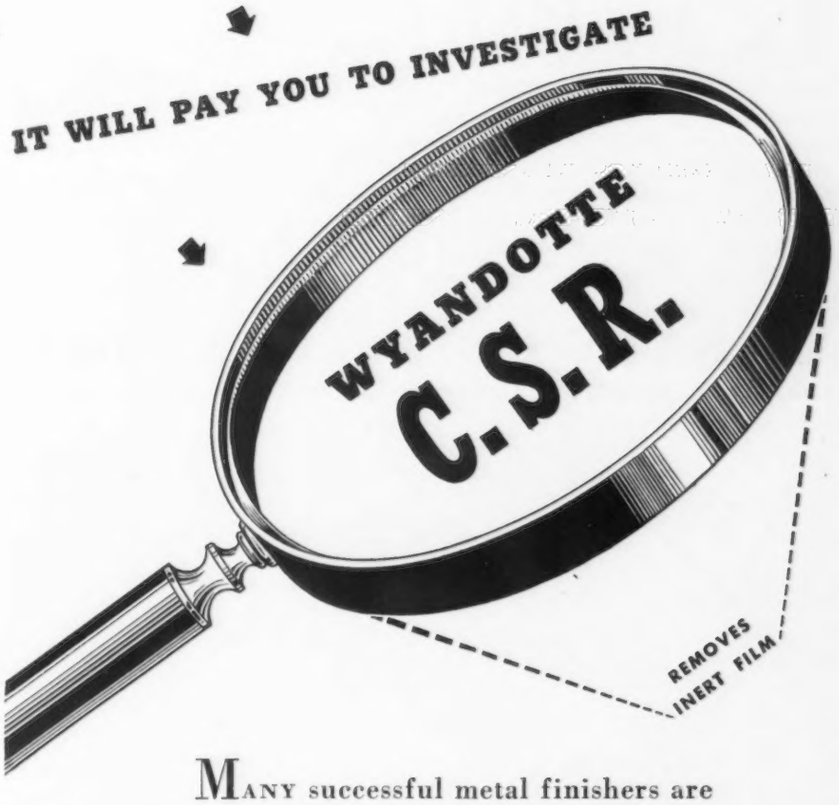
Labor relations will be in charge of Sidney Hillman, head of CIO's Amalgamated Clothing Workers Union of America. SEC member Leon Henderson was assigned to the job of watching prices of industrial materials as they moved from their initial stage to the finished product, while consumer prices and trends are to be observed by Miss Harriet Elliott, dean of women, University of North Carolina.

Chester C. Davis is the advisory member selected to see that agricultural commodity prices to farmers are lined up with the administration farm program policy of agricultural and industrial price "parity." Mr. Stettinius and Mr. Knudsen are the only full-time members of the Commission.

Duties of the Advisory Commission were outlined at some length by the President at a press conference last Thursday after he met with all members of the commission, except Mr. Hillman, who was ill in New York. Present at the conference were all members of the cabinet, except Secretary of State Hull and Postmaster General Farley. Also present were Gen. George C. Marshall, Chief of Staff, and Admiral Harold R. Stark, Chief of Naval operations; Senate Majority Leader Barkley of Kentucky and House Majority Leader Rayburn of Texas.

Though legally subordinate to the Council of National Defense, consisting of Secretary of War Woodring, Secretary of the Navy Edison, Secretary of Interior Ickes, Secretary of Commerce Hopkins and Secretary of Agriculture Wallace, the President said that the Advisory Commission has been given the responsibility of putting the national defense program into action and that it has all the authority of the World War War Industries Board, directly responsible to the President and not required to clear through the Council of National Defense. In some quarters, however, doubt was expressed that in reality the Commission actually has such broad powers.

The President's explanation of duties of the Advisory Commission was taken to reflect a partial retreat at least of previous White House statements indicating that the New Deal will maintain full control of mobilization plans.



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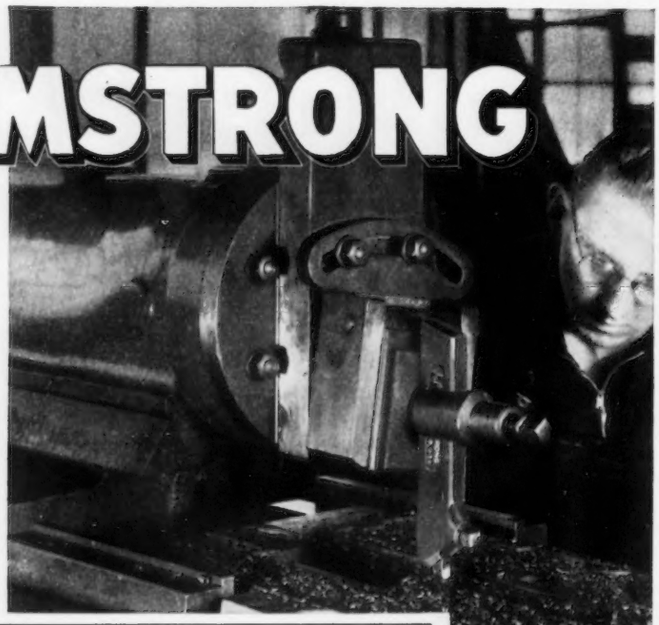

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Nevertheless if there has been any yielding of the administration's earlier announcement that industrial experts will be called in "not to supersede, but to work with, advise with and coordinate with officers of the government," it was a question as to how much this position has been changed.

For instance, it was pointed out that the President himself has named no chairman of the commission and apparently for the present he has assumed that job through William H. McReynolds, of the White House secretariat, made secretary of the commission. At the same time it was not made clear whether Secretary Hopkins would still act as a sort of overall industrial adviser with the aid of the Business Advisory Council. Secretary of the Treasury Morgenthau's job as coordinator of the machine and aircraft industries has been assigned to Mr. Knudsen.

Under the 1916 Council of National Defense act the council, which the President says will be ignored, is authorized simply to supervise and direct investigations and make recommendations to the President respecting mobilization plans, while the Advisory Commission is authorized by law only to advise the council. The latter is required to provide for the work of the Advisory Commission "to the end that the special knowledge of such commission may be developed by suitable investigation, research and inquiry and made available in conference and report for the use of the council."

The President remarked, however, that of course the administration had to live up to the law and indicated that there would be no occasion for friction between the council and the commission.

Despite the President's statement regarding the power of the commission the conviction has grown that a stronger and more centralized mobilization organization authority will have to be set up. It is recalled that in the World War, President Wilson found it necessary to abolish the council-commission organization and set up the War Industries Board with extremely broad powers under the direction of Bernard M. Baruch. While, as the President has said, the two emergencies are not comparable, the fact remains that the purpose is the same—getting supplies in mass quantities from industry as expeditiously as possible.

That purchasing of "raw" mate-

rials will not be placed in the hands of the commission was made clear by Secretary Ickes who said they would continue to be bought by the government in the regular way. "Raw" materials as used by administration officials refers to all products up to the point of assembly into the ultimate equipment. Manufacture of the ultimate unit, such as a tank, gun, rifle, etc., is called "fabrication."

Just made acting director of the Treasury Department's Procurement Division, which buys non-military items, is Donald M. Nelson, executive vice-president of Sears, Roebuck & Co., who succeeds Capt. Harry E. Collins, who resigned as director to become manager of the export department of the Bell Aircraft Corp., Buffalo. Mr. Nelson also succeeds Captain Collins as chairman of an informal interdepartmental committee coordinating foreign military purchases in the United States, reporting to the President through the Secretary of the Treasury.

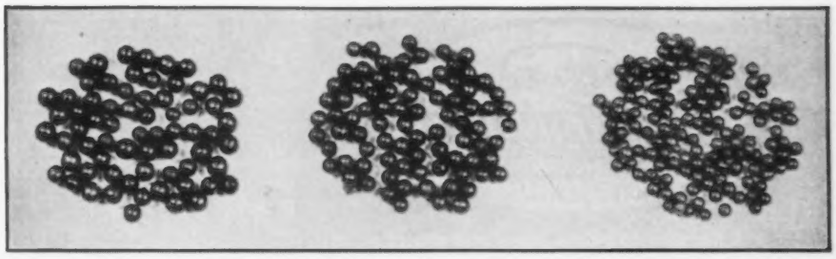
Outlining the work of the Advisory Commission as he says it will operate, the President said that Mr. Stettinius will supervise the steady flow of processing of raw materials. Mr. Knudsen, it was stated, will obtain from the War and Navy Departments their requirements and in order to develop standardization as much as possible, reduce types and specifications to a minimum. The orders then will be placed with plants equipped to fill them. The next step for Mr. Knudsen, it was explained, will be that of scheduling, so that materials will be produced, processed and delivered to the ultimate "fabricating" plants, an outstanding purpose being to avoid bottlenecks.

Predicting that there would be no difficulty in getting deliveries, the President said that Mr. Budd will work with President J. J. Pelley of the Association of American Railroads and heads of other transport agencies.

Aircraft Accessories Plant at Dayton Moved

Dayton

• • • **In order to take** care of an increasing volume of business, the Gem City Sheet Metal & Mfg. Co., headed by Carl Wilcke, president, is moving its plant operations from the third floor of United Aircraft Manufacturing Building, to 121 West Franklin Street. The company is widely known in aviation circles for its aircraft accessories and its spun metal products.



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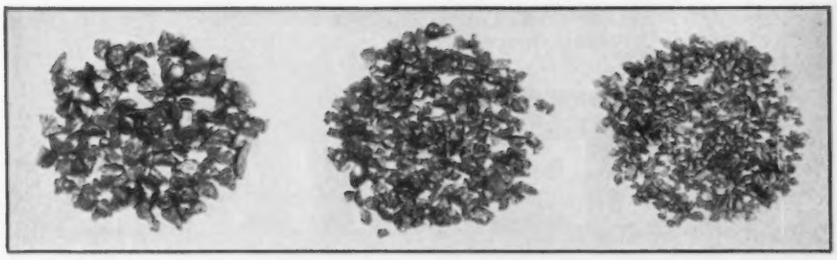

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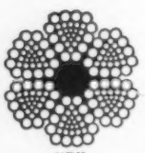
Style B
Flattened Strand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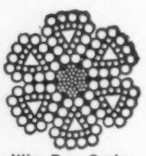
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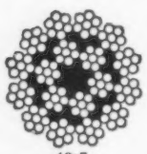
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Filler Wire

6x19
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Extra Flexible

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Extra Flexible

Army Ordnance Exhibit At SAE June 9 Meeting

Detroit

• • • **A three-day exhibit** of U. S. Army ordnance equipment will be made at the 35th Anniversary summer meeting of the Society of Automotive Engineers, June 9-14, at White Sulphur Springs, W. Va. Included in the exhibit will be a light tank, scout car, military truck, 37 mm. anti-tank gun, 37 mm. anti-aircraft gun, .50 cal. anti-aircraft machine gun and .30 cal. semi-automatic rifle. The exhibit has been made possible through the cooperation of Maj. Gen. C. M. Wesson, chief of ordnance.

Technical sessions will deal with aircraft engines, transportation and maintenance, trucks, bus and railcars, passenger cars, diesel engines, automobile bodies, and fuels and lubricants.

NLRB Dismisses Complaint Of AFL Machinists Union

Washington

• • • **Reversing a trial** examiner's ruling, the National Labor Relations Board last Thursday held that American Shoe Machinery & Tool Co., St. Louis, had not refused to bargain collectively with AFL's International Association of Machinists, District No. 9; had not discriminatorily refused reinstatement of 13 of its employees who were members of the IAM, and had not interfered with the right of its employees to engage in self-organization. The board, consequently, dismissed the complaint.

U. S. Farm Equipment Exports Up 42% in April

Washington

• • • **April exports of** farm equipment totaled $10,013,391, a 42 per cent increase over corresponding shipments in April, 1939, when they amounted to $7,067,114. Figures compiled by the Machinery Division, Department of Commerce, show that the largest export advances were registered in tillage implements, and tractors, parts and accessories, while foreign sales of other classes of farm equipment remained comparatively steady.

Detroit Runners "Help" Alien Workers Become Citizens

Detroit

• • • **A new racket** being worked in the vicinity of industrial plants at the expense of factory workers seeking United States citizenship has been described here by Paul G. Werner, director of naturalization. The racket has arisen from the recent governmental order that no alien may work in any industrial plant filling government contracts. Mr. Werner said that "runners" were posting themselves outside factory gates offering to help workers file citizenship applications and charging a fee for the service. Such a service can do the alien worker no possible good, Werner said.

Tuthill Spring Observes Its 60th Anniversary

• • • **In celebration** of its 60th anniversary, the Tuthill Spring Co., Chicago, has published a booklet which relates the history of the company and traces its progress. Known chiefly for its contributions to automotive springs, Tuthill has developed numerous markets for spring steel, including steel furniture, household appliances, highway guard rails, toy springs and many others.

Ohio Schools Will Teach Machine Shop Practice

Cleveland

• • • **For the first** time in 10 years, machine shop practice will be taught during the summer at Cleveland's two principal technical high schools. Instructors report that pupil applications for these courses are exceptionally heavy, while demand from manufacturing plants for graduate students also is at a peak.

Warren Company Buys Central Tube Plant

Warren, Ohio

• • • **Hetz Construction** Co., Warren, has purchased the plant of Central Tube Co. at Ambridge, Pa., Pittsburgh suburb, for subdivision after rehabilitation. Approximately 500,000 sq. ft. of floor space are available. The buildings were erected in 1924 and the site is approximately 40 ft. above high water level.

Geared to the Pace of Modern Industry

HIGH-SPEED Farquhar Presses are playing an important part in the modernization of many plants . . . and a reduction in cost of press operations. For over thirty years the Farquhar organization has been building exactingly engineered hydraulic presses for stamping, forming, drawing, and straightening.

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Defense Drive Provides "Out" for Opponents of Logan-Walter Bill

Washington

• • • **Administration strategists** in the Senate last week found the national defense burden imposed on Congress as a convenient "out" when pressed to set a definite date for bringing to the Senate floor the controversial Logan-Walter bill, under which many government agencies would be subjected to a uniform pattern of administrative procedure and aggrieved parties assured of more adequate court review.

Senate Majority Leader Barkley, who admitted he was opposed to the bill but denied he was deliberately blocking action, declined the request of Senator Carl A. Hatch, Democrat of New Mexico, to fix a definite date in the future for bringing the Logan-Walter measure to the Senate floor.

Senator Barkley reflected the fears expressed by heads of executive departments that the bill would "hamstring" administrative agencies, and advanced this reason for withholding action on the measure:

"Certainly the American people are not so much concerned with that legalistic technical situation in the departments of our government as they are now with our domestic and international situation growing out of the World War."

Senator Henry F. Ashurst, debonair and scholarly chairman of the Senate Judiciary Committee, whose members voted 18 to 16 for the Logan-Walter bill, agreed that defense measures should be given right-of-way in Congress.

But speaking further of the Logan-Walter bill's objectives to assure adequate court review for an ever-increasing number of Federal administrative decrees, the Senator said:

"But forsooth, of what purpose is it, on the one hand, to expend billions of dollars in taking care of the liberty of the American people and then by silent attrition, by secrecy, by processes of which the citizen has no knowledge, take away the very liberty we are undertaking to save."

Senator Ashurst avoided making a direct charge that Senate Majority Leader Barkley had been blocking action on the bill but instead sought to pin the responsibility on officers or employees of departments and bureaus who, he said, "have been issuing their ukases and ipsi dixits in secrecy, without giving anyone a hearing."

Allegations that the National Association of Manufacturers, through paid lobbyists, had inspired a great many letters to Congressmen, urging that the Logan-Walter bill be enacted, were made by Senator Minton, Democrat of Indiana, and ardent Administration supporter.

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Johnson Bearings are easier to install. Whether your job calls for 10—or 10,000 you will find each bearing strictly uniform in tolerances . . . in concentricity . . . in finish. Constant laboratory control from basic metal to shipping room . . . specialized machinery . . . skilled help—all combine to give you the finest bearings in the market.
Johnson Bearings are uniform in alloy too. Everyone is cast in S.A.E. 64—Copper 80%—Tin 10%—Lead 10%. For more than 60 years this alloy has remained the favorite of engineers and maintenance men.
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Industry Expands at Many Points To Enable U. S. to Defend Itself

• • • **Reports of** expanding industrial capacity to meet needs of the national defense program and to handle the sharply increased requirements of peacetime business came this week from many sections of the country. Building activity is noticeable particularly in the airplane and machine tool industries.

At Bridgeport, Conn., the Bullard Co. has awarded a contract for a 360 x 90 ft. addition to its foundry. So urgent is the need for the addition to the company's factory space that all plans and specifications were prepared in two weeks and the Turner Construction Co., builder, has agreed to give occupancy within three months. "It is natural," E. P. Bullard, president, said, "that this company should be called upon to do its share in the defense program, now that another world emergency exists."

Warner & Swasey Co., Cleveland, has announced a second addition to its plant. An extension of 30,000 sq. ft., started a month ago, is scheduled to be completed shortly and is now to be followed by another 20,000 sq. ft. expansion, according to Charles J. Stilwell, president. At the same time the basement of the main Warner & Swasey plant building will be extended 12,000 sq. ft. to provide more storage space.

Meanwhile Air Associates, Inc., manufacturer of aircraft parts and accessories will begin construction at once of a $300,000 plant at Bendix, N. J., into which it will move in September from its present plant at Roosevelt Field, L. I. The new plant will contain about 70,000 sq. ft., or double the present plant's area.

Expansion of the Union Drawn Steel division of Republic Steel Corp. at Massillon, Ohio, announced this week by E. M. Richards, assistant vice-president in charge of operations, will be in the stainless bar and wire department and will include the rehabilitation of part of an existing building 700 x 150 ft. Modern equipment will be installed and work will be begun by June 15, with D. D. Buchanan as manager of operations.

Construction of a fifth unit for Clark Controller Co., at 1146 East 152nd Street, Cleveland, will be carried out by the J. L. Hunting Co. Heavier domestic orders account for this building program. P. C. Clark, president, reports that the company's May business topped the corresponding month of 1939 by 60 per cent.

The contract for complete rebuilding of National Tube Co.'s No. 3 blast furnace at Lorain, Ohio, has been awarded to Arthur

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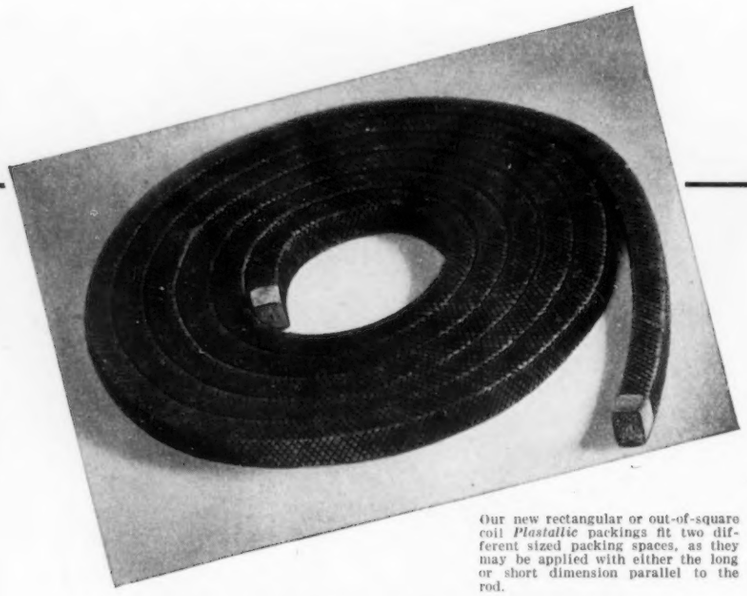
G. McKee Co., Cleveland. Eight to nine months will be required to rebuild the stack from the foundations up, repair its stoves, reorganize trackage and build a new cast house. Average daily capacity of the new furnace will be 1100 net tons.

A fully mechanical furnace for mass production heat treatment of forgings, castings or rough machined parts of uniform size, under closely controlled temperature and time conditions, has just been completed by the Metlab Co., Philadelphia. The furnace is designed to handle work such as will be required in the defense drive, will have a capacity exceeding 1000 lb. per hr. or 12 tons a day on 24-hr. operation, and will accommodate parts of a size up to about 5 in. in diameter, 24 in. long. The furnace is gas fired, and the heat treating machine consists of three sections, preheating, saturation, quenching and tempering, through which the work is continuously, mechanically conveyed at regulated speed.

Mid-West Abrasives Co., Detroit, has purchased the plant of the former American Malleable Co., Owosso, Mich., and will remodel it for immediate use in the manufacture of abrasive materials for precision parts in the aircraft, automotive and other industries. James T. Jackson, Detroit, is president and general manager while L. F. Guetschow is secretary and general manager.

A licensing agreement under which Douglas twin-engine attack bombers will be built by the Boeing Aircraft Co. in Seattle is revealed in a recent announcement that Boeing will increase plant space by 75 per cent. The agreement coincided with receipt of Allied orders for approximately $23,000,000 worth of planes from each of the two companies. It is regarded as an important step in the direction of standardization, since it provides for the first time a set-up under which identical planes will be manufactured in quantities at two widely separated plants. (The Douglas Aircraft Co. is located at Santa Monica, Cal., with other plants in the same area.

The Boeing building addition will cover about 600,000 sq. ft. of new floor area and will cost about $2,000,000, including principal equipment.



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Detroit A.S.T.E. Members Will Meet on June 13

Detroit

• • • **A discussion** of "Machine Design and Motion Economy" will be given at the June meeting of the Detroit Section, American Society of Tool Engineers by O. W. Habel, factory manager, and G. G. Kearful, methods engineer, Saginaw Steering Gear division, General Motors Corp. The meeting will be held June 13 at the Fort Shelby Hotel. It will be followed by a motion picture, "Building Economy into Machine Tools," a picture developed by the Saginaw Steering Gear division.

Chrysler Celebrates Its 15th Anniversary

Detroit

This week Chrysler Corp. celebrates its 15th anniversary (June 6) by opening two new engineering and research buildings in Highland Park, Mich. A special press preview was scheduled for the day, and a reception for about 5000 people will be held June 7. Invitations to the preview have been issued jointly by the famed engineering trio, Zeder-Skelton-Breer. These are Fred M. Zeder, vice-chairman of the board, Owen R. Skelton, director of engineering design, and Carl Breer, director of engineering research, the three designers of the original Chrysler car and the men who got Walter P. Chrysler "into the business."

Speaking of the occasion Mr. Zeder noted that Chrysler has spent more than $57,000,000 in engineering and product development during the past 15 years. The new buildings add 162,000 sq. ft. of floor space devoted to engineering and research. They house 94 laboratories, offices and test rooms, in which, on an average day, 1500 research tests and projects are in progress. At a given time upward of 2500 items may be under investigation by the 500 white-coated individuals in the organization.

Commenting on the high degree of organization in automotive research, Zeder has revealed that each project has not only a stated objective, but also a detailed budget and a deadline for completion. The budget and deadline are strictly adhered to, he adds, except that extensions are sometimes granted when careful analysis shows that a slow project is proceeding in the right direction and promises to pay off eventually "in the uncompromising terms of a better car or lower manufacturing costs."

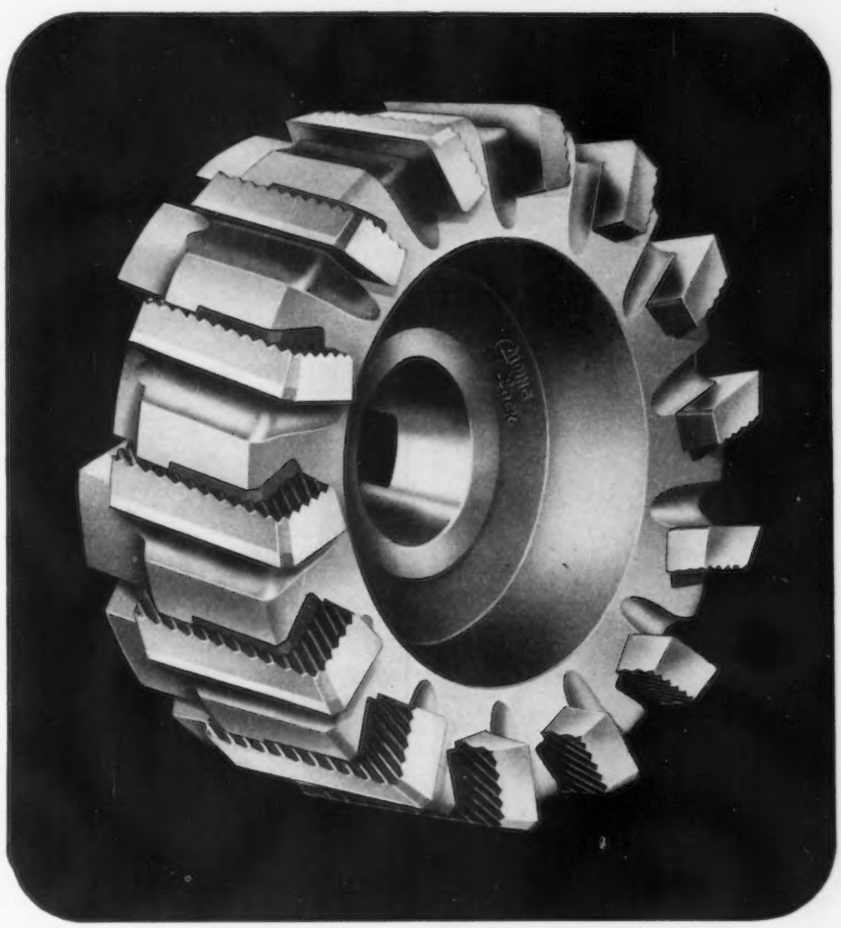
Since 1924, Mr. Zeder recalls, Chrysler Corp. engineering and research facilities have grown from a three-room laboratory, into a small wooden building, then into a four-story building, and successively up through two more floors that were added to it. With the opening of these two new buildings, more buildings and further expansion are already planned, Zeder says.

Michigan Ore Shipments In '39 Exceed 11,000,000 Tons

Lansing, Mich.

• • • **Iron ore shipments** from Michigan last year were 11,239,895 tons, the second highest total in five years, according to the State Conservation Department. Underground and open pit mines produced 9,116,938 tons of ore, the third largest production of the period, according to a department report. Stock piles accumulated during the season when navigation was impossible accounted for the difference between tonnage mined and tonnage shipped. The Marquette range provided 4,907,623 shipping tons, the Gogebic range provided 4,175,150 tons and the Menominee range, 2,157,122 tons.

More than 5800 miners were employed during the year.



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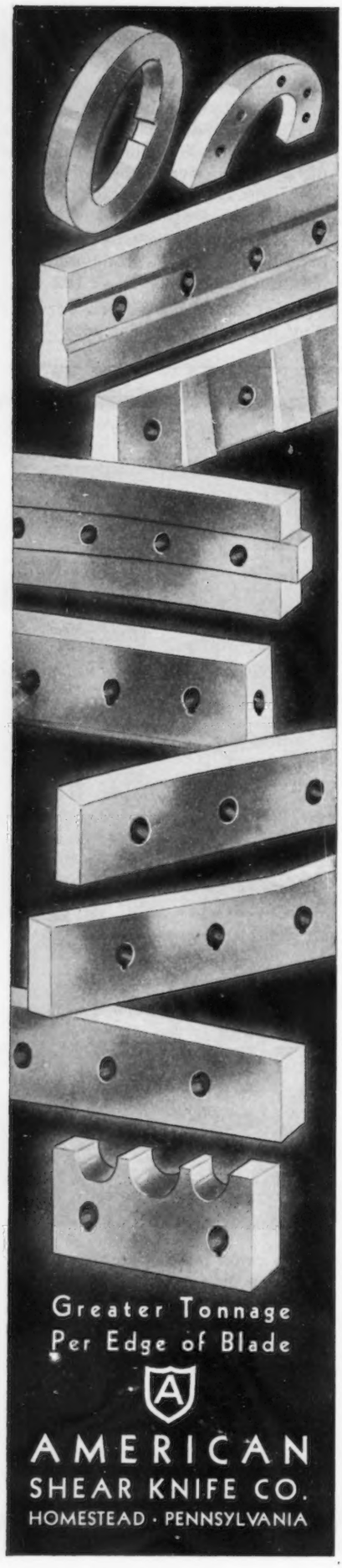


Government Orders for Week $2,176,892

Washington

• • • **Government contracts** for iron and steel products, as reported by the Labor Department's Public Contracts Division for the week ended May 25, totaled $2,176,892. Reported for the same period were contracts totaling $394,175 for non-ferrous metals and alloys; and $249,090 for machinery. Details follow:

Iron and Steel Products

Pennsylvania Forge Corp., Philadelphia, forgings, $44,269; Joseph T. Ryerson & Son, Inc., Jersey City, N. J., steel reinforcement, $22,449; Lynchburg Foundry Co., Lynchburg, Va., water pipe, $10,780; General Railway Signal Co., Rochester, machined shell, $112,560; U. S. Steel Export Co., rope, wire, nails, $19,697; New York Air Brake Co., Watertown, N. Y., machined shell, $79,552; J. B. Beaird Corp., Shreveport, La., machined shell, $108,919; Continental Roll & Steel Foundry Co., East Chicago, castings, $19,972; Henry Disston & Sons, Inc., Philadelphia, steel, $12,447; Pennsylvania Forge Corp., Philadelphia, tube forgings, $44,767; Standard Steel Works, North Kansas City, Mo., box assemblies, $19,468; Taylor-Wharton Iron & Steel Co., Easton, Pa., forgings for shell, $129,770; Builders Iron Foundry, Providence, R. I., telescope mounts, $105,509; Wilson-Weesner-Winkinson Co., Knoxville, Tenn., miscellaneous hardware, $13,225; Tennessee Coal, Iron & Railroad Co., Birmingham, reinforcing steel, $13,264; Budd Wheel Co., Detroit, smoke shells, $259,466; U. S. Steel Export Co., New York, pipe, steel, welded, $14,427; Jones & Laughlin Steel Corp., Pittsburgh, tinplate, $21,242; Continental Gin Co., Birmingham, machined shell, $72,521; Harrington & Richardson Arms Co., Worcester, Mass., automatic pistols, $192,497; Remington Rand, Inc., Buffalo, cabinets for range, field, $171,569; Wm. R. Bootz, Successor to Crescent Stove Works, Evansville, Ind., fire units for range, field, $92,749; William Scrimgeour, Washington, knives, spoons, forks, $11,424; Singer Mfg. Co., Elizabeth, N. J., automatic pistols, $278,875; Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., nuts, bolts, $20,078; Alan Wood Steel Co., Conshohocken, Pa., steel plates, etc., $194,370; Westinghouse Electric & Mfg. Co., Essington, Pa., base rings and racks, $72,183.

Non-Ferrous Metals and Alloys

Scovill Mfg. Co., Philadelphia, 5c. blanks, $106,000; American Brass Co., Waterbury, Conn., cartridge cups, $112,119; American Brass Co., Waterbury, Conn., cartridge discs, $50,841; Aluminum Cooking Utensil Co., New Kensington, Pa., equipment for range, $114,657; Walter Kidde & Co., Inc., New York City, parts for fire extinguishers, $10,556.

DONALD M. NELSON, executive vice-president, Sears, Roebuck & Co., has been named by Secretary Morgenthau as acting director of the Treasury's Procurement Division, a post in which he will have charge of most of the Government's ordinary purchasing. Mr. Nelson was a code administration director and a resident director of the industrial advisory board under NRA, and also served as assistant to the chairman of the National Industrial Recovery Administration.

Machinery

Hardie-Tynes Mfg. Co., Birmingham, lock valves, $64,808; Bardons & Oliver, Inc., Cleveland, lathe, turret, $21,115; C. H. Gosiger Machinery Co., Dayton, Ohio, motor and lathe, $12,251; South Bend Lathe Works, South Bend, Ind., lathes, $14,366; E. W. Bliss Co., Brooklyn, coining press, $12,960; Jones & Lamson Machine Co., Springfield, Vt., turning lathes, $42,213; The Leece-Neville Co., Cleveland, parts for diesel engines, $10,412; The American Laundry Machinery Co., Cincinnati, laundry machinery, $46,358; The Carlton Machine Tool Co., Cincinnati, radial drill, $12,179; Pratt & Whitney Division, Niles-

Bement-Pond Co., West Hartford, Conn., jig borer, $12,426.

↓ ↓

Washington

• • • **Aggregating $705,600,** five contracts for 23,500 gross tons of manganese ore were awarded recently by the Treasury Department's Procurement Division. Distribution of the tonnage and the price per unit follow:

Boulder Dam Manganese Corp., Las Vegas, Nev., 5000 tons, grade A, 62c. f.o.b. cars, Ogden, Utah, $148,800; Western Alloys, Inc., 2500 tons, grade A, 61c. f.o.b. cars, Ogden, $73,200; Base Metals Corp. of America, Baltimore, 6500 tons, grade B, 69c. c.i.f., Baltimore Harbor, $215,280.

Derivatives, Inc., and Tonerade, Inc., New York, 7000 tons, grade B, 57c. c.i.f., Baltimore Harbor, $191,520; Cuban Mineral Products, Inc., Havana, Cuba, 2500 tons, grade C, f.o.b. cars, Curtis Bay, Md., $76,800.

↓ ↓

Washington

• • • **The War Department** has awarded $288,609 in educational orders to these companies:

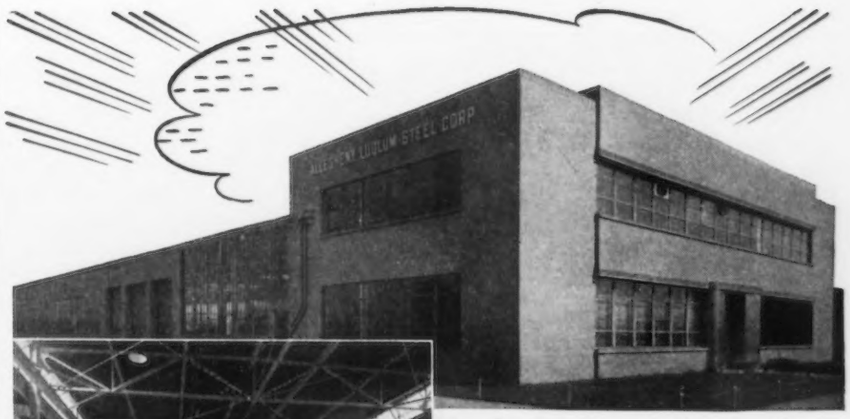
Acushnet Process Co., New Bedore, Mass., fully molded faceblanks and related items, $37,520; and the Milwaukee Stamping Co., Milwaukee, fully molded faceblanks and related items, $251,089. These contracts are for the chemical warfare service.

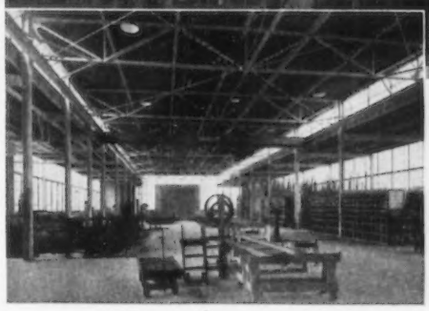
↓ ↓

Washington

• • • **The Navy Department's** Bureau of Supplies and Accounts has awarded contracts to these companies:

The Torrington Co., Torrington, Conn., ball bearings, $6,345; Buffalo Forge Co., Buffalo, bending rolls, $9,144; Sperry Gyroscope Co., Brooklyn, electrical gyro stabilized octant instrument, $5,452; Pioneer Instrument Division of Bendix Aviation Corp., Bendix, N. J., drift sights, $12,900; General Electric Co., Schenectady, N. Y., cable, $12,672; National Tube Co., Pittsburgh, steel tubing, $11,931; Tidewater Supply Co., Inc., Norfolk, Va., milling machine, $6,540; Chas. E. Crofoot Gear Corp., South





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Makers of Allegheny Metal

matches the Durability of its new Building with a

Carey BONDED BUILT-UP ROOF.*

THE new Chicago warehouse and office of the Allegheny Ludlum Steel Corporation is of brick and steel construction, modern and efficient in every detail, of most pleasing appearance. To insure a roof in keeping with the permanent character of this modern building, the builders chose a CAREY Specification No. 4 Built-Up Roof.

CAREY Roofs last years longer because they are backed by 67 years' experience in the manufacture of roofing materials. CAREY Roofing Products and service quickly available everywhere through a nation-wide organization. Write or phone the nearest CAREY Branch. Send for "Specifications for Bonded Roofs"—address Dept. 26.

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BRANCHES IN PRINCIPAL CITIES

Easton, Mass., gears and pinions, $11,738; Armstrong Bros. Tool Co., Chicago, wrenches, $15,414; Pacific Marine Supply Co., Seattle, portable pumps, $5,602; Penn Galvanizing Co., Philadelphia, sheet steel, $6,135; and the Phelps Dodge Copper Products Corp., New York, alloy tubing, $31,301.

United Aircraft Corp., Hamilton Std. Propellers Division, East Hartford, Conn., constant speed control unit, $17,540; American Car & Foundry Co., New York City, valves, $10,333; Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, milling machine, $17,296; The Midvale Co., Philadelphia, steel, nickel, ingots, $19,743; Gisholt Machine Co., Madison, Wis., turret lathes $11,487; Pioneer Instrument Division of Bendix Aviation Corp., Bendix, N. J., generators and synchroscopes, $46,900.

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ARMCO HIGH TENSILE STEEL

Tool Engineers Add Two More Chapters

• • • **With the chartering,** May 8 and 9, of two more chapters, one covering Brooklyn and Long Island, and one for the cities of Binghamton, Endicott and Johnson City, N. Y., the American Society of Tool Engineers has in the past 12 months increased its membership by over 50 per cent and brought the total number of chapters to 35. Since last May, 11 new chapters with an initial membership alone of over 1000 have been added.

W. T. Forde, production engineer, International Business Machines Corp., was elected chairman of the newly formed Binghamton Chapter. Elected vice-chairman was Warren Kishbaugh, efficiency engineer, Scintilla Magneto Division, while Donald G. Goetcheus, tool designer, Universal Instruments and Metals Co., and Walter Hediger, plant engineer, Scintilla, were named secretary and treasurer, respectively.

About 175 members and prospective members attended the charter meeting of the Greater New York Chapter, A.S.T.E., at Pratt Institute, Brooklyn, May 8. The meeting elected the following officers for the coming year: Chairman, A. J. Duncan, chief tool designer, E. W. Bliss Co.; vice-chairman, Tom Orchard, sales engineer, Herbert Hall Co.; treasurer, A. J. Schwister, field manager, Greenfield Tap & Die Co., and secretary, Holbrook Horton.

Chicago Ordnance Chief Pledges Aid to Industry

Chicago

• • • **Lieut.-Col. Donald Armstrong,** commander of the Chicago ordnance district, has asked THE IRON AGE to inform its readers of the willingness of the department to cooperate to the fullest extent with private manufacturers. No educational orders have been placed in this district recently other than those reported in THE IRON AGE two weeks ago but Colonel Armstrong says that more of these orders may be seen shortly.

Knudsen To Be Coordinator Of Machine Tools

Washington

• • • **A committee of** the machine tool industry, meeting this week with Secretary of the Treasury Henry Morgenthau, Jr., announced appointment of a defense committee of 15 executives headed by Clayton R. Burt, president, Pratt & Whitney division, Niles-Bement-Pond-Co., Hartford, Conn.

At the same time the machine tool leaders recommended a machine tool coordinating committee, to include William S. Knudsen, General Motors Corp. president who, Secretary Morgenthau announced, will act as Government coordinator of the machine tool industry as well as director of "fabricated" production for the National Defense Advisory Commission.

The coordinating committee of eight men will operate under a proposed voluntary system of priorities and allocations, favoring domestic over foreign orders. A report issued by the 15-man defense committee said the industry would, when necessary, expand working forces, sublet parts or complete machines to various factories not engaged in important Government work, adopt simplified machines to facilitate deliveries, and commandeer machine tools now on order for foreign countries.

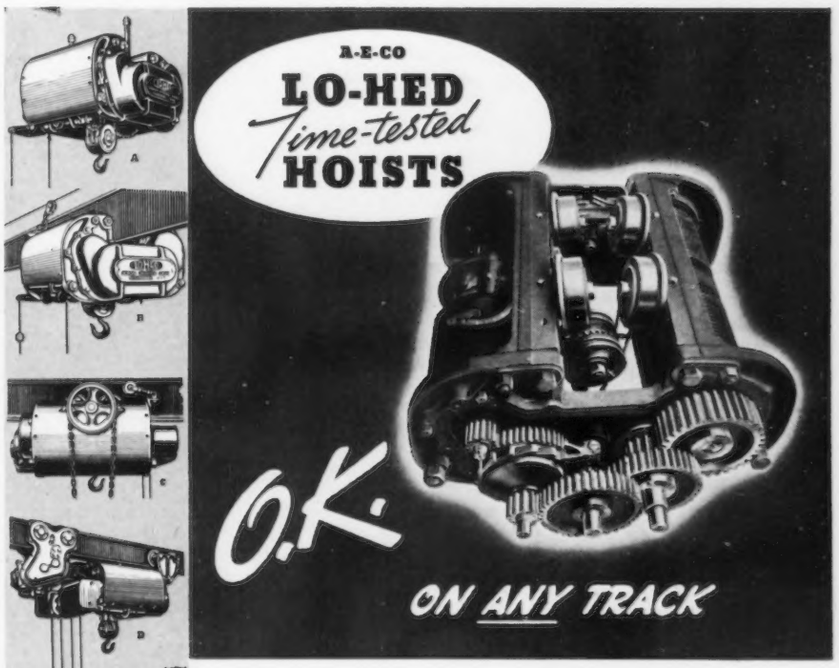
"Since no authority exists for enforcement of priorities, cooperative action of all parties will be neccessary if priorities are to be effective," the report warned. Foreign orders will be accepted subject to U. S. priorities.

At meetings to be held shortly the Army and Navy will submit details covering various lists of sizes, kinds and types of machines that will be required.

Members of the defense committee of the National Machine Tool Builders' Association are:

Chairman Burt; Henry Buker, vice-president, Brown & Sharpe Mfg. Co., Providence, R. I.; F. H. Chapin, president, National Acme Co., Cleveland, Ohio; Howard W. Dunbar, vice-president, The Norton Co., Worcester, Mass.; Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt.; James Gleason, president, Gleason Works, Rochester, N. Y.; Charles J. Stilwell, president, Warner & Swasey Co., Cleveland; Fred V. Geier, president, Cincinnati Milling Machine Co., Cincinnati; Norman D. MacLeod, president, Abrasive Machine Tool Co., East Providence, R.I.; Robert M. Gaylord, president, Ingersoll Milling Machine Co., Rockford, Ill.; Phil Huber, president, Excello Corp., Detroit; E. A. Muller, president, King Machine Tool Co., Cincinnati; G. A. Rentschler, president, General Machinery Co., Hamilton, Ohio; Joseph L. Trecker, president, Kearney & Trecker Corp., Milwaukee, and W. E. Whipp, president and general manager, Monarch Machine Tool Co., Sidney, Ohio.

Ex-officio members of the committee are: J. E. Lovely, president, National Machine Tool Builders' Association, and vice-president and chief engineer, Jones & Lamson Machine Co., and Tell Berna, secretary of the committee and general manager of the National Machine Tool Builders' Association, Cleveland.



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A—Bolt Suspension Type.
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A hoist and the track on which it travels are partners for your profit. One should fit the other. That does not mean both must be made by the same manufacturer any more than an automobile tire must be made by an automobile manufacturer.

The Lo-Hed Hoist is built to run on standard I-beams or, with very slight modifications, on any track system. We make neither I-beams nor track systems. We believe that your ability to buy a hoist independent of the track is an advantage in shopping, in making track changes, or in switching the hoist location.

Get this time-tested advantage. While you're about it, look into all the other time-tested features of the Lo-Hed illustrated in the open-view of the Lo-Hed Hoist on this page: Heavy duty hoist type motor, automatic lowering brake, anti-friction bearings, stub tooth spur gears, plow-steel cable, 100% positive automatic upper limit stop, dust and moisture-proof controller. (Construction varies slightly for classes of Lo-Heds.)

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100% Steel Rate Possible under U. S. Defense Plan

Pittsburgh

• • • **The steel industry** can reach 100 per cent of ingot capacity operations just as rapidly as demands are made upon it and could advance to at least 110 per cent of theoretical capacity with only limited and possibly temporary hold-ups.

Whether the industry will be called upon to reach these high levels remains to be seen, but driven on by export business, forward domestic buying to escape possible steel shortage, and the possibility of a tremendous U. S. Government armament program, raw steel production in the nation is already considerably higher than had been expected a few months ago.

Even if that portion of export demand coming from France and England should be withdrawn from the picture because of European war developments, it is expected that some of the breach would immediately be filled by U. S. Government requirements. The Government program may be slow getting started in its initial stages but some steel makers look for ultimate steel requirements for domestic armament preparedness approximating a maximum of 12,000,000 tons a year.

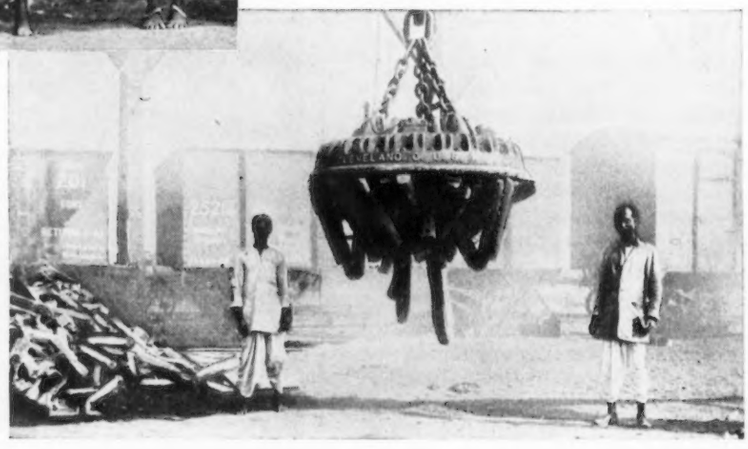
Regardless of subsequent European war developments and their effect upon the American steel industry, the latter finds itself productionwise in the best position in its history, thanks largely to the drive for increased maintenance and replacement of obsolete equipment which grew out of the sharp upsurge in steel activity in 1937 and again in 1939.

When and if steel ingot output goes higher than theoretical capacity limited bottlenecks in blooming mill and soaking pit capacity would likely be encountered, but the difficulty would not be in total steel tonnages rolled but rather in specific products. By this is meant that although enough slabs could be produced, some of them might be at the expense of required billet tonnage, but studies on these potential problems are already under way and the situation can probably be handled speedily when and if met. Finished steel capacity is entirely adequate to take care of any needs placed upon it.

Actual production of steel ingots can be stepped up sharply by increased use of bessemer converters, inauguration of duplex steel making programs at some plants, further expansion in the use of synthetic scrap, and a step-up in the percentage of pig iron used in making open hearth steel.

From a labor standpoint, the steel industry sees no shortages with respect to purely steel labor classifications, with the possible exception of welders, chippers, or

This job pays 15¢ a day



IMAGINE carrying pig iron on your head all day long for about the price of one quart of milk . . . yet an EC&M Lifting Magnet proves more economical. It doesn't tire in the scorching heat of India—works just as well, too, in rain or snow of northern climates.

Used on caterpillar, steam and overhead cranes or similar material-handling machines, thousands of EC&M Lifting Magnets are helping offset increased taxes and labor costs in America. Investigate them.

Bulletin 900 shows how EC&M Magnets profitably handle rails, kegs of nails, scrap iron, bundles of steel, etc. Ask for a copy.

THE ELECTRIC CONTROLLER & MFG. CO. CLEVELAND, OHIO

HEAVY DUTY MOTOR CONTROL FOR CRANES, MILL DRIVES AND MACHINERY • BRAKES • LIMIT STOPS • LIFTING MAGNETS AND AUTOMATIC WELD TIMERS.

scarfers. Intensive vocational programs, however, have been in effect for the past few years and a bottleneck in the chipping or scarfing of regular steel products could be soon remedied as is now being done at some plants by the introduction of mechanical scarfing equipment.

The scarcity of mechanics and machine tool operators would undoubtedly affect this class of workmen as it applies to requirements by the steel industry.

While definite opinions as to what can be done steel-wise in this country in the case of an acute emergency remain conjectural, it is noteworthy that the steel industry from a production and metallurgical standpoint has gone a long way since the first world war.

Helping to pay for the crane is another important advantage of the EC&M Lifting Magnet. The above is a Northwest Caterpillar Crane equipped with an EC&M No. 3½ Type SA 39-inch diameter Lifting Magnet working in a Wisconsin scrapyard.

THE ELECTRIC CONTROLLER & MFG. CO.
2698-A EAST 79TH STREET **CLEVELAND, OHIO**

Capacity Steel Rate Forecast By N. J. Clarke

Cincinnati

• • • **Capacity or** near-capacity steel plant operations are likely to follow the greatly increased demand for steel products, and such high rates are likely to continue for a considerable period, N. J. Clarke, vice-president in charge of sales for Republic Steel Corp., told members of the National Association of Purchasing Agents.

The United States is the only steel exporting nation left to supply needs of nations still at peace since Luxembourg and Belgian steel plants are in German hands, domestic business in the U. S. is improving aside from war considerations, and the extensive armament and shipbuilding program at Washington will require enormous tonnages, Mr. Clarke told the purchasing agents here for their 25th annual convention.

Charles R. Hook, president, American Rolling Mill Co., told the convention that "the old bridge of private enterprise needs to be solidly rebuilt." He urged that excessive taxation, unbridled spending and bureaucratic domination be replaced by individual initiative, confidence and understanding.

Three points of view on the effect of the war on business activity were set forth this week in a special survey issued by the purchasing agents. These are:

1—A smashing German victory would break price structures, because of unsettled supply-demand relations and resulting downcast attitude among the majority of the people in this country.

2—Allied successes, indicating a continued struggle on European battlefields, would stimulate industrial activity here and boost price levels in many lines.

3—Irrespective of the war's winner, the demand for armament and defense materials would support many industries at high operating levels for months to come.

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I AM A PRODUCTION MAN

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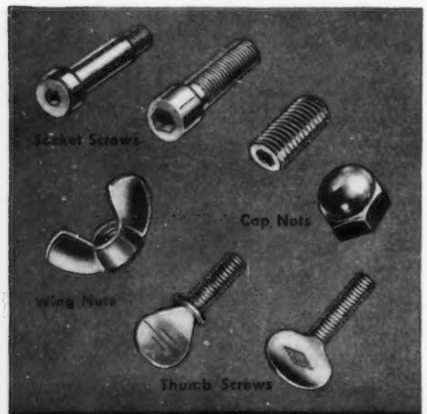

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SOCKET SCREWS WING NUTS
CAP NUTS THUMB SCREWS
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Political Buffoonery

If We Hadn't Seen It, We Wouldn't

A DAY or so after the President leaped from seven years of inactivity on national defense into a dream world of 50,000 planes overnight, the War Department dramatically sent telegrams to all leading aircraft manufacturers to attend a conference in Washington at 10 a. m., Monday, May 20, at which time the great program would be explained and the cooperation of the industry sought.

A War Department telegram is not something to throw in the wastebasket. So on Sunday the manufacturers arrived from far and near. On Monday morning they prepared to meet with the Government to hear details. At 9:30 a. m., there was still no place scheduled for the meeting, but finally word filtered through that the manufacturers were to meet in the Treasury Department. The room proved to be so small that half the manufacturers couldn't even get in.

Next came the grand entrance of the Secretary of the Treasury Henry Morgenthau, whose presence had not been expected, and Assistant Secretary of War Louis Johnson.

Next came the photographers and the newsreels with many gracious words being spoken for the benefit of movie patrons. Mr. Morgenthau then excused himself. After extending a greeting, Colonel Johnson likewise bowed out. Remaining was Gen. George Brett, Chief of the Army Air Corps Materiel Division. Poor General Brett! First of all he had to confess that the program wasn't prepared, that it would be at least 10 days in the making. Next he had to confess that the Chief of the U. S. Air Corps likewise did not know what the program was to be. All he could say was what already had been said to the tune of hundreds of columns of newspaper space—that the Government wanted to do something, that it depended on private industry, that if it built factories it wouldn't operate them. Shortly the meeting broke up. Puzzled, bewildered, disgusted, the manufacturers filed out of the Treasury Department.

What's it all about? Can the country in these days afford

Stettinius Resigns to Serve on Defense Board

• • • **E. R. Stettinius, Jr.,** has resigned as chairman of the board and a director of the United States Steel Corp. in order to serve as a member of the National Defense Commission. His resignation was accepted by the board of directors at a special meeting Tuesday. Irving S. Olds, a director since October, 1936, was elected chairman of the board.

William S. Knudsen, president, General Motors Corp., has obtained a leave of absence to serve the Government on the commission.

↓ ↓

Washington

• • • **Quickly organizing** his plans as director of "raw material" production for the National Defense Advisory Commission, Edward R. Stettinius, Jr., United States Steel Corp. chairman, on Tuesday completed selection of his staff. It is made up of prominent industrialists, economists and army and navy representatives. Among those selected are the following: William L. Batt, president, SKF Industries, Philadelphia; Gano Dunn, president of the J. G. White Engineering Corp.; Clarence Francis, president of the General Foods Corp.; Prof. Charles C. Leith, University of Wisconsin; Consultant on Strategic Metals, Prof. Theodore Yntema, University of Chicago, economic adviser and statistical expert; Allen R. Morton, vice-president of the Koppers Co., American Hammered Piston Ring Division, Baltimore, Speciai Assistant to Mr. Stettinius; Col. James Byrnes, executive officer to the Assistant Secretary of War, Capt. Allen B. Reed, assistant to Chairman Land of the Maritime Commission, representing the Navy.

Have Believed It

such a fiasco as this? Every manufacturer in the United States is working night and day. He hasn't time to go on wild goose chases. The Government KNOWS that industry will cooperate—and cooperate to the top limit. The industry has never let the country down, but as much can't be said for a Government that has dilly-dallied, chiseled the manufacturers for below-cost production, and left the industry to shift for itself during the past decade. Was it merely a big political gesture to call in the manufacturers and have some newsreels made? Was it cricket for the cabinet officers to show to the industry and the public that the men in the Air Corps who know what they are talking about haven't been in on the plans from the start? That this is no time to make buffoons out of an industry that is willing and able to do the job for national defense. Let's cut out the circus stuff and get busy on a program that should have been started five years ago, and let experienced men who know their business have the say so about it.—From *American Aviation.*

Note—Worried Managers Of Industrial Relations

• • • **Secretary of Labor** Frances Perkins has joined the drive on Communists. She told the International Ladies Garment Workers Union convention held this week at New York:

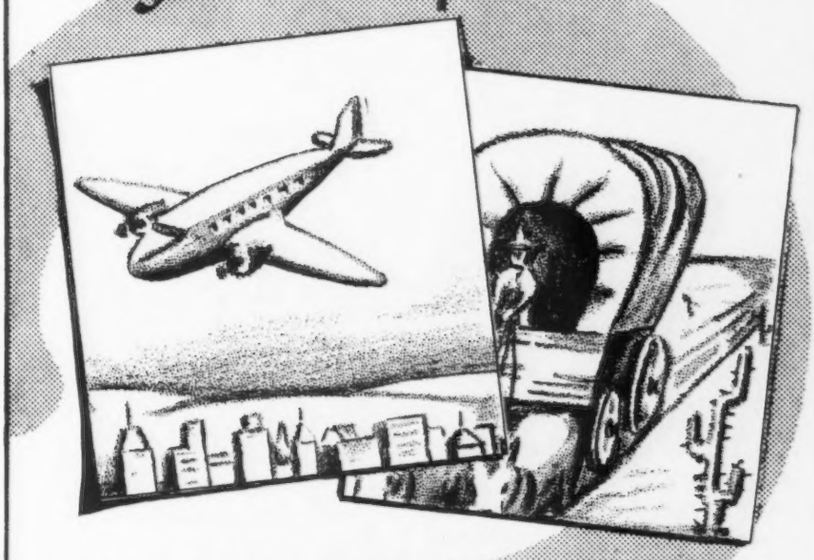
"I think we are going to see the labor movement of the United States free of all tricks, free of all crooks, free of all Communists and free of all 'fifth columnists.'"

Half Million Dollar Tank Order for Baldwin

Washington

• • • **The war department** on Tuesday announced that an educational order amounting to $587,694 for the manufacture of light tanks has been given to the Baldwin Locomotive Works.

By Comparison

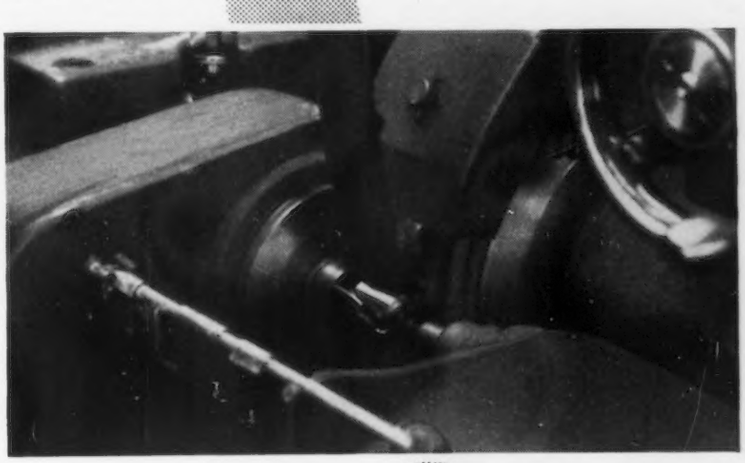


Which Would You Choose?

One is new and one is old. One saves time, the other loses it. Both are headed for the same destination but the one takes hours and the other takes months. We have little doubt as to which you would choose, for the new and improved will always push out the old. This is just as true in modern manufacturing as it is in transportation. For instance—

An airplane instrument manufacturer was grinding alloy nickel rotors of electrical tachometers on an old grinder. The machine turned out 6 of these rotors per hour. Then a new Landis 6" Type C Plain Hydraulic machine was installed. The production immediately leaped to 20 per hour, an increase of 233%, in spite of the fact that .060" of stock was removed within limits of +.001 —.000.

There are probably many instances in your own plant where production could be improved and money saved if you would but make a choice—the new rather than the old. 334



LANDIS TOOL COMPANY
WAYNESBORO PENNSYLVANIA

Personals

Change is inevitable in progressive Industry. Change is constant.

• **George M. McGranahan,** has been named director of production engineering at the new plant of the Dow Chemical Co. which is being erected at Freeport, Tex. Mr. McGranahan has been assistant chief engineer at the Midland (Mich.) plant. The new Dow plant will produce from sea water the magnesium for the manufacture of Dowmetal.

• **Victor A. Olsen,** works manager of Cadillac Motor Car Co., has been made general manager of GM's Detroit transmission plant. **Clarence A. Raftrey,** for the past six years assistant works manager at Cadillac, succeeds Mr. Olsen in that position.

• **Stanley M. Mercier,** who has had a long and varied experience in industrial and construction engineering, design and sales, has been appointed chief engineer, conveyor division, of the Jeffrey Mfg. Co., Columbus.

• **Marshall Williams,** assistant to the president, American Bridge Co., Pittsburgh, has retired after having been associated with the subsidiary of U. S. Steel Corp. and predecessor companies since April, 1898.

Mr. Williams joined the bridge and construction department of the Pencoyd Iron Works, Pencoyd, Pa., as chief shop inspector and was appointed assistant operating manager of the Eastern division of American Bridge Co. in 1901. He went to Pittsburgh as operating manager of the Pittsburgh division in 1902 and performed special duties from 1904 to 1911 when he resumed the position of operating manager in the Pittsburgh division. Mr. Williams was appointed assistant to the president in 1917 and in 1927 became assistant general operating manager. He resumed the position of assistant to the president in 1931 and has continued in that capacity to date.

GEORGE M. McGRANAHAN, director of production engineers at new Texas plant of Dow Chemical Co.

VICTOR A. OLSEN, general manager of GM's Detroit transmission plant.

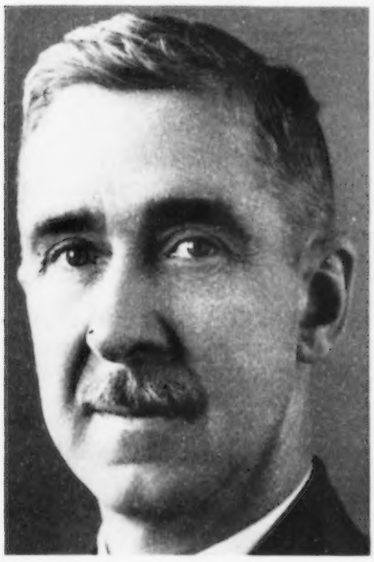
• **John W. Murphy** has been made assistant manager of sales in the Baltimore district for Bethlehem Steel Co., Bethlehem, Pa. Mr. Murphy has served as a salesman with Bethlehem since 1924 and has been in the Baltimore district since 1930. He was previously with the Boston office of Midvale Steel & Ordnance Co. Mr. Murphy was graduated from Massachusetts State College at Amherst, Mass., in 1916.

• **Charles P. Kimmel,** assistant to the general superintendent of Gary works of Carnegie-Illinois Steel Corp., retired last week after 51 years of service to the steel industry. His first association with the steel industry was at Pueblo, Colo., when at 16 years of age he became a machine shop apprentice in the plant of the Colorado Coal & Iron Co. After seven years, he had worked himself up to roll turner and went to Paterson, N. J., to work for the Passaic Rolling Mill Co. Two years later he was back at Pueblo as a journeyman roll turner and then templet filer. In 1908 he went to Gary as roll shop superintendent of the then unfinished Gary works. In 1914 he was named merchant mill superintendent and assistant works superintendent four years later. When Walter Hadley replaced W. P. Gleason as general superintendent in 1936, this title was

CLARENCE A. RAFTREY, new works manager at Cadillac.

changed to assistant general superintendent. In 1937 this title was passed on to **Stephen Jenks** and Mr. Kimmel became known as assistant to the general superintendent.

• **E. H. Anchors,** for several years branch manager for the Air Reduction Sales Co. at Atlanta, Ga., has been appointed manager of the Oklahoma City district. Mr. Anchors began his career 15 years ago with the Commercial Acetylene Supply Co. and was Southern manager of this company when it was acquired by the Air Reduction company. Since that time he has served continuously as branch manager at Atlanta.



STANLEY M. MERCIER, chief engineer, conveyor division, Jeffrey Mfg. Co.

• **C. W. Simpson,** formerly vice-president and works manager of National Acme Co., Cleveland, has been made executive vice-president. **R. C. Kinley,** superintendent, is now vice-president and works manager. **B. H. Ayers,** assistant superintendent, has been advanced to superintendent.

• **Albert C. Schweitzer** has been appointed Eastern district traffic manager of U. S. Steel Corp. subsidiaries, succeeding **Charles W. Trust,** recently made general traffic manager.

Mr. Schweitzer joined the traffic department of the former Carnegie Steel Co. in 1906 and has been assistant traffic manager of the Eastern district for U. S. Steel Corp. subsidiaries since 1938.

W. A. Cramer has been made assistant traffic manager, Eastern district, succeeding Mr. Schweitzer, and **D. M. Morewood** has been named district office manager.

JOHN W. MURPHY, new assistant manager of sales in Baltimore for Bethlehem Steel Co.

• **Fred L. Lawrence** has been appointed Detroit district manager for Copperweld Steel Co., Warren, Ohio. He will make his headquarters in the General Motors Building. He attended the University of Michigan and had previously been connected with the Frost Gear & Forge Co., Jackson, Mich., as chief metallurgist; with Pittsburgh Crucible Steel Co., Midland, Pa., as senior metallurgist, and later as sales engineer and sales representative for the same company in the Detroit office.

• **R. E. Densmore,** who has been Western sales manager and later field sales manager for Norge, Inc., Detroit, has been appointed national sales supervisor for the Youngstown Pressed Steel Co., Warren, Ohio. For many years he was associated with the Nash-Kelvinator Corp.

• **T. D. Cartledge,** heretofore general sales manager, and **L. A. Bliss,** heretofore works manager, of the Linde Air Products Co., a unit of Union Carbide & Carbon Corp., New York, have been elected vice-presidents. **E. J. Hayden,** who has been manager of the company's Central division, has been made vice-president of that division.

E. H. ANCHORS, manager of Oklahoma City district for Air Reduction Sales Co.

E. B. Suydam, formerly assistant general sales manager, has been appointed general sales manager to succeed Mr. Cartledge, and **P. B. Pew,** formerly assistant works manager, has been appointed works manager to succeed Mr. Bliss.

• **John G. Bergdoll,** who joined the York Ice Machinery Corp., York, Pa., in 1914 as a machinist apprentice, and who since then has held the positions of draftsman, equipment development engineer and assistant chief engineer, has been promoted to chief engineer of the corporation.

• **C. K. Bryce** has been elected vice-president of Oxweld Acetylene Co., a unit of Union Carbide & Carbon Corp., New York. Mr. Bryce was formerly manager of factories.

• **A. I. Richardson** has been appointed manager of the Allis-Chalmers Mfg. Co. district office at Dallas. He was previously located at the company's district office in Charlotte, N. C. Mr. Richardson is a graduate in mechanical engineering of Texas A & M Col-

lege. He entered the employ of Allis-Chalmers in 1925, spending two years in the shops prior to preparing for sales engineering work. Since then he has had experience in the company's district offices at Atlanta, Chattanooga, Tenn., and Charlotte, N. C.

• **C. M. White,** vice-president in charge of operations, Republic Steel Corp., Cleveland, was presented with a life membership in the National Association of Foremen at a dinner given in his honor at the Hotel Cleveland, Cleveland, on May 27.

• **W. L. Martwick,** general sales manager of the Foster Wheeler Corp., New York, has been elected a vice-president.

• **J. S. Bennett** has been made manager of sales of the American Engineering Co., Philadelphia. **William H. Schutze** has become sales manager of the marine division, and **C. L. Myers** continues as sales manager of the stoker division.

• **George W. Person,** of the sales engineering department of the Norton Co., Worcester, Mass., has been transferred to the St. Louis territory to assist the present representative, **Arthur W. Cox.**

J. L. de Vou, Jr., and **George L. Freeman,** of the home office, have been appointed field engineers of the Cleveland and Chicago districts respectively.

• **A. M. Mosley,** who has been associated with the Cohoes Rolling Mill Co., Cohoes, N. Y., for the past 43 years, recently as vice-president and general manager, has retired from active duty. He will continue as consulting engineer. **M. L. Jacob,** formerly assistant general manager, has been made general manager, and **C. F. Anderson,** formerly connected with Clayton Mark & Co., and Youngstown Sheet & Tube Co., has been appointed works manager.

Carl B. Foster, office manager of the Chevrolet engineering department, General Motors Corp., has been elected president of the General Motors Men's Club, succeeding **J. L. Wallace,** Fisher Body export chief in Detroit. Among other officers named to serve are **Harry Bigler,** personnel manager of General Motors Research Division, vice-president; **Ed. Herrold,** supervisor of insurance and tax division, Fisher Body, secretary; and **N. W. Torgeson,** of United Motors Service, treasurer.

Obituary

CLINTON E. WILDER, National Forge & Ordnance Co. president who died recently

Clinton E. Wilder, president and general manager of National Forge & Ordnance Co., Irvine, Pa., died May 23. Born in Keene, N. H., in 1879, he lived on a farm for 13 years after which he learned the machinist's trade and attended night school. Mr. Wilder, an outstanding figure in the forging industry, at various times was superintendent of the Driggs Ordnance Co., Sharon, Pa., and superintendent of the Erie Forge Co., Erie, Pa. In 1915 he left Erie Forge to start the National Forge & Tool Co., predecessor company of National Forge & Ordnance Co.

WARREN ELSEY, JR., late general superintendent of the Central Iron & Steel Co.

• **Warren Elsey, Jr.,** general superintendent of the Central Iron & Steel Co., Harrisburg, Pa., died of a heart attack in that city on May 28, aged 52 years. Before joining the Central Iron company as assistant general superintendent in 1927, he was an official of the Penn-Seaboard Steel Co. He was made general superintendent early last year.

• **Harry G. Marburger,** superintendent of the Northville, Mich., plant of the Ford Motor Co. for the past 21 years, died May 29 in Henry Ford Hospital, Detroit.

• **Edward N. Shepard,** president and treasurer of the Cleveland Pressed Steel Co., died May 23 in Coden, Ala. He was 72 years old.

• **John F. Priest,** of the former Boston firm of Priest, Page & Co., died May 28 at his home in Newton, Mass. He was 90 years old. The firm discontinued its steel business at its Batterymarch Street warehouse some 20 years ago.

• **Harvey C. Wilson,** secretary, Cleveland Cooperative Stove Co. for 21 years, died May 28 at his home in Cleveland.

• **William D. McCullough,** president of Premier Products Co., manufacturer of automobile accessories, died May 30 at his country home near Rochester, Mich. Born in Detroit 54 years ago, and graduated from Detroit schools, Mr. McCullough lived in Alberta, Canada, for several years. He returned to Detroit in 1912. He served from that year until 1915 as purchasing agent for the Cadillac Motor Car Co. In the latter year he organized the Premier Cushion Spring Co. When this firm was absorbed by Reynolds Spring Co., Jackson, Mich., in 1929, Mr. McCullough continued as president of Premier Products Co., an affiliate.

May Pig Iron Output Rises 8.4%

PRODUCTION of coke pig iron in May totaled 3,513,683 net tons, compared with 3,137,019 tons in April. On a daily basis the gain in May production was 8.4 per cent over that in April, or from 104,567 tons to 113,345 tons in May. The operating rate for the industry was 74.8 per cent against 68.6 in April, and compares with 40.8 per cent in May last year.

There were 172 furnaces in blast on June 1, operating at the rate of 119,905 net tons a day, compared with 157 on May 1, making 106,395 net tons daily.

The United States Steel Corp. blew in 15 furnaces and took two off blast, independent producers put five in operation and blew out or banked two furnaces, and one merchant unit went into blast and two were taken off.

Furnace Operations Now at 74.8%, with 172 Stacks in Blast June 1

Among the furnaces blown in were: One Carrie, one Clairton, three Duquesne, two Ohio, one Farrell, two South Chicago (new), one South Chicago (old), and four Gary, Carnegie-Illinois Steel Corp.; one Eliza, Jones & Laughlin Steel Corp.; one Monessen, Pittsburgh Steel Co.; one Norton, American Rolling Mill Co.; one Shenango, Shenango Furnace Co.; Madeline No. 3, Inland Steel Co., and one Pioneer, Republic Steel Corp.

Furnaces blown out or banked included: One Edgar Thomson, Carnegie-Illinois Steel Corp.; one Ensley, Tennessee Coal, Iron & Railroad Co.; one Anna, Struthers Iron & Steel Co.; one Otis, Otis Steel Co.; one Federal, Interlake Iron Corp., and No. 2 Madeline, Inland Steel Co.

Production by Districts and Coke Furnaces in Blast

(All Figures in Net Tons)

FURNACES	May, 1940	April, 1940	May, 1939	June 1, 1940: Number in Blast	June 1, 1940: Operating Rate, Net Tons a Day	May 1, 1940: Number in Blast	May 1, 1940: Operating Rate, Net Tons a Day
New York:							
Buffalo	211,692	195,963	139,100	9	6,830	9	6,530
Other New York and Mass.	.....	.....	.....	0	....	0	....
Pennsylvania:							
Lehigh Valley	87,428	81,748	55,655	5	2,820	5	2,725
Spiegeleisen	4,738	4,735	4,992	1	155	1	160
Schuylkill Valley	44,768	40,861	21,550	3	1,445	3	1,360
Susquehanna and Lebanon Valleys	40,291	42,065	16,654	2	1,300	2	1,400
Ferromanganese	3,100	2,931	.....	1	100	1	100
Pittsburgh District	734,106	650,888	346,503	36	26,835	28	21,695
Ferro. and Spiegel.	11,452	26,564	3,348	2	370	4	885
Shenango Valley	29,151	14,839	.....	3	1,795	1	675
Western Pa.	108,922	84,494	52,970	6	3,515	6	2,815
Ferro. and Spiegel.	15,834	15,408	2,352	1	510	1	515
Maryland	198,197	196,014	138,704	6	6,395	6	6,535
Wheeling District	172,051	164,075	81,732	7	5,550	7	5,470
Ohio:							
Mahoning Valley	361,646	282,927	173,429	15	12,015	14	10,635
Central and Northern	256,882	247,420	141,284	12	8,150	13	8,560
Southern	60,719	59,836	52,686	5	1,960	5	1,995
Illinois and Indiana	671,001	564,078	364,607	27	24,450	21	18,805
Michigan and Minnesota	124,707	122,771	81,217	6	4,025	6	4,090
Colorado, Missouri and Utah	64,060	62,996	51,337	4	2,065	4	2,100
The South:							
Virginia	.....	.....	.....	0	....	0	....
Ferromanganese	3,200	3,248	3,135	1	105	1	110
Kentucky	23,414	12,759	16,150	2	835	1	425
Alabama	274,776	255,321	176,213	15	8,305	16	8,645
Ferro. and Spiegel.	9,737	2,772	.....	2	315	1	90
Tennessee	1,811	2,306	.....	1	60	1	75
Total	3,513,683	3,137,019	1,923,618	172	119,905	157	106,395

Production of Coke Pig Iron and Ferromanganese

(All Figures in Net Tons)

	Pig Iron* 1940	Pig Iron* 1939	Ferromanganese† 1940	Ferromanganese† 1939
January	4,032,022	2,436,474	43,240	23,302
February	3,311,480	2,307,409	38,720	20,894
March	3,270,499	2,681,969	46,260	17,928
April	3,137,019	2,302,918	43,384	12,900
May	3,513,683	1,923,618	44,973	8,835
June	.....	2,372,665	....	18,611
½ year	.....	14,025,053	....	102,470
July	.....	2,639,022	....	23,758
August	.....	2,978,991	....	23,103
September	.....	3,223,983	....	24,583
October	.....	4,062,901	....	26,817
November	.....	4,166,888	....	33,999
December	.....	4,220,536	....	40,654
Year	.....	35,317,374	....	275,384

*These totals do not include charcoal pig iron. †Included in pig iron figures.

Daily Average Production of Coke Pig Iron

	1940	% Capacity	1939	% Capacity	1938
January	130,061	85.8	78,596	51.5	51,632
February	114,189	75.1	82,407	54.0	51,931
March	105,500	68.9	86,516	56.8	52,476
April	104,567	68.6	76,764	50.4	51,376
May	113,345	74.8	62,052	40.8	45,343
June	.....	...	79,089	51.7	39,648
½ year	.....	...	77,486	...	48,717
July	.....	...	85,130	55.8	43,417
August	.....	...	96,096	62.9	53,976
September	.....	...	107,466	70.4	62,737
October	.....	...	131,061	85.9	74,147
November	.....	...	138,877	90.9	84,746
December	.....	...	136,146	89.4	79,872
Year	.....	...	96,760	...	57,633

Merchant Iron Made, Daily Rate

	1940	1939	1938	1937	1936
January	16,475	11,875	11,911	18,039	11,801
February	14,773	10,793	9,916	18,496	12,652
March	11,760	10,025	9,547	18,432	12,131
April	13,656	9,529	9,266	16,259	15,565
May	16,521	7,883	7,203	21,821	14,352
June	....	8,527	6,020	17,774	15,914
July	....	9,404	6,154	21,962	13,013
August	....	11,225	7,408	19,971	13,606
September	....	12,648	12,550	22,473	14,029
October	....	16,409	12,095	21,224	15,282
November	....	16,642	14,793	17,541	16,508
December	....	16,912	10,226	12,280	16,634

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	June 4, 1940	May 28, 1940	May 7, 1940	June 6, 1939
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.00
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.00
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plates:				
(Dollars Per Base Box)				
• Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.45
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	1.92
Skelp (grvd.)	1.90	1.90	1.90	1.90

	June 4, 1940	May 28, 1940	May 7, 1940	June 6, 1939
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$24.84	$24.84	$24.84	$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap:				
(Per Gross Ton)				
Heavy melting steel, P'gh	**$19.00**	$18.75	$17.25	$14.75
Heavy melting steel, Phila.	19.00	18.50	16.75	15.25
Heavy melting steel, Ch'go	17.75	17.25	16.25	13.75
Carwheels, Chicago	**19.00**	18.75	17.75	12.75
Carwheels, Philadelphia	20.75	20.75	20.25	16.00
No. 1 cast, Pittsburgh	19.25	19.25	17.75	15.25
No. 1 cast, Philadelphia	20.75	20.75	20.25	16.25
No. 1 cast, Ch'go (net ton)	**17.00**	16.25*	15.75	12.25

*Corrected.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$4.00	$4.00	$4.00	$3.75
Foundry coke, prompt	5.25	5.25	5.25	4.75
Non-Ferrous Metals:				
(Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.*	11.50	11.50	11.50	10.00
Copper, Lake, New York	11.50	11.50	11.50	10.00
Tin (Straits), New York	**55.00**	53.50	47.625	48.75
Zinc, East St. Louis	**6.25**	6.00	5.75	4.50
Lead, St. Louis	4.85	4.85	5.00	4.60
Antimony (Asiatic), N.Y.	16.50	16.50	16.50	14.00

*Mine producers only.

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
June 4, 1940	2.261c. a Lb.	$22.61 a Gross Ton	$18.58 a Gross Ton
One week ago	2.261c. a Lb.	$22.61 a Gross Ton	$18.17 a Gross Ton
One month ago	22.61c. a Lb.	$22.61 a Gross Ton	$16.75 a Gross Ton
One year ago	2.236c. a Lb.	$20.61 a Gross Ton	$14.58 a Gross Ton

	High	Low	High	Low	High	Low
1940	2.261c., Jan. 2	2.211c., Apr. 16			$18.58, June 4	$16.54, Mar. 19
1939	2.286c., Jan. 3	2.236c., May 16	$22.61, Sept. 19	$20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c.. Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Allies send commission here to arrange for larger steel purchases . . . Steel orders, backlogs and production expand and scrap prices advance further . . . Gain of 15 active blast furnaces in May

A BRITISH-FRENCH commission of steel men has arrived in the United States to confer with American steel interests relative to a steady flow of iron and steel from this country to the Allies to replace what was being obtained from the invaded countries of Belgium and Luxembourg.

Apart from Allied purchases, which have recently been quite heavy, export demand has become definitely quieter. Although a substantial tonnage of unshipped business is still on mill books, new orders from neutral countries are smaller in aggregate volume. It appears likely, however, that orders from Great Britain, France and Canada will more than offset any losses that may occur.

Inquiries from South American countries and elsewhere are numerous, but foreign buyers are slow in closing, a condition that may be only temporary and which is believed by exporters to be due to the disturbing effect of German successes.

Meanwhile, domestic business has expanded in nearly all directions, resulting in higher steel operations, increases in backlogs as new orders exceed production and shipments and in advancing scrap prices. The upward trend is developing, however, in a more orderly manner than was true last fall after the outbreak of war.

A SOBERING influence is the realization that our own national defense program may not develop with the speed that was at first envisaged so far as large-scale steel requirements are concerned. However, projects which had already been planned are being expedited. One of the first munitions contracts, other than educational orders, has been placed with the York Safe & Lock Co., York, Pa., for 350 carriages for 37 mm. anti-tank guns. A half-million dollar order for light tanks has been placed with Baldwin Locomotive Works. Building awards for defense purposes are more numerous and include 2500 tons of fabricated structural steel for a new building for the Boeing Aircraft Co. at Seattle, 1200 tons for an Army hangar at Fairbanks, Alaska, and 2000 tons for a National Guard drill hall in Washington, while inquiries include 2200 tons for a Government storehouse at Oakland, Cal., and 2100 tons for airplane hangars at Alameda, Cal.

The appointment of William S. Knudsen as Government coordinator of the machine tool industry will relieve machine tool builders of the responsibility of making individual decisions as to priority. Under his supervision an industry committee of eight members will serve to put into effect the voluntary system of priorities and allocations.

A priority system may eventually be required in alloy steels, particularly electric furnace grades, as mills are already jammed with orders though the larger prospective requirements of the airplane and other industries are yet to be experienced. Delivery promises on alloy steels now range from 12 to 16 weeks.

Another bottleneck likely to be experienced is in coke. Although steel ingot output is this week only 80½ per cent, a gain of two and a half points over last week, some steel companies have bought outside coke, their own coke-making facilities being engaged at capacity.

PIG iron production has expanded rapidly along with steel. There was a gain of 15 active blast furnaces during May, 172 having been in blast on June 1 against 157 on May 1. Total output of coke pig iron last month was 3,513,683 net tons compared with 3,137,019 tons in April. On a daily basis of 113,345 tons, last month's gain was 8.4 per cent over the April daily rate of 104,567 tons. All of the gain last month was in steel making iron. U. S. Steel made a net gain of 13, independents gained three, while there was a net loss of one merchant furnace.

Further gains in steel and pig iron production are likely because of the following factors: Heavy specifications for sheets and strip against recent low priced commitments have been placed and will be turned out rapidly, although the tonnage is so large that observance of the June 30 deadline may not be possible in all cases; the automobile industry is about to place orders for 1941 model production; the railroads are expected to initiate repair and equipment buying programs.

To prepare for a period of high production, steel companies are bringing down a large amount of Lake Superior iron ore. The movement up to June 1 totaled 7,743,196 gross tons, an increase of 4,084,945 tons over the same period in 1939.

Without much influence from export business, scrap markets continue to show marked strength, price advances on the No. 1 grade in some centers ranging from 50c. to $1 a ton. THE IRON AGE scrap composite is up 41c. to $18.58.

The Industrial Pace . . .

WEEK-TO-WEEK movements in manufacturing operations continue to show an upward trend, and as yet there are no indications that this upward movement is assuming "runaway" proportions. To the contrary, there are many visible factors which suggest that efforts are being made to avoid any abnormal expansion of production activities.

THE IRON AGE index of capital goods activity, which has been rising steadily over the past month, received a temporary setback last week by the sharp decline in automobile assemblies. The index at the close of the week stood at 75.1, as compared with 76.3 in the preceding week and 74.6 three weeks ago.

The decline in the automobile index, after allowances for the short week, amounted to 16.6 points. It is significant to note that in the corresponding week of both 1939 and 1929 declines of 14.2 and 20 points respectively were recorded.

A strengthening of the construction series was noted as expansion of aircraft production and storing facilities got under way. Of the week's total construction awards amounting to $78,575,000, approximately $11,500,000 involved aircraft facilities. The largest single contract awarded during the week was for the Coulter Shoals Dam in Tennessee. Cost of this T.V.A. project was $28,500,000.

Steel output in the current week shows another improvement, although the advance, as was expected, is not as sharp as it was in the preceding four weeks. The present week's rate, 80.5 per cent, is the highest point reached since the last week of January.

The scrap iron and steel composite price continues to rise, reflecting not so much actual buying as it does buyers' and sellers' appraisals of the market's potentialities. The composite now stands at $18.58, as compared with $18.17 a week ago. The current price is the highest since the week of Nov. 28, 1939, and compares with $22.50, the high point of last fall's movement.

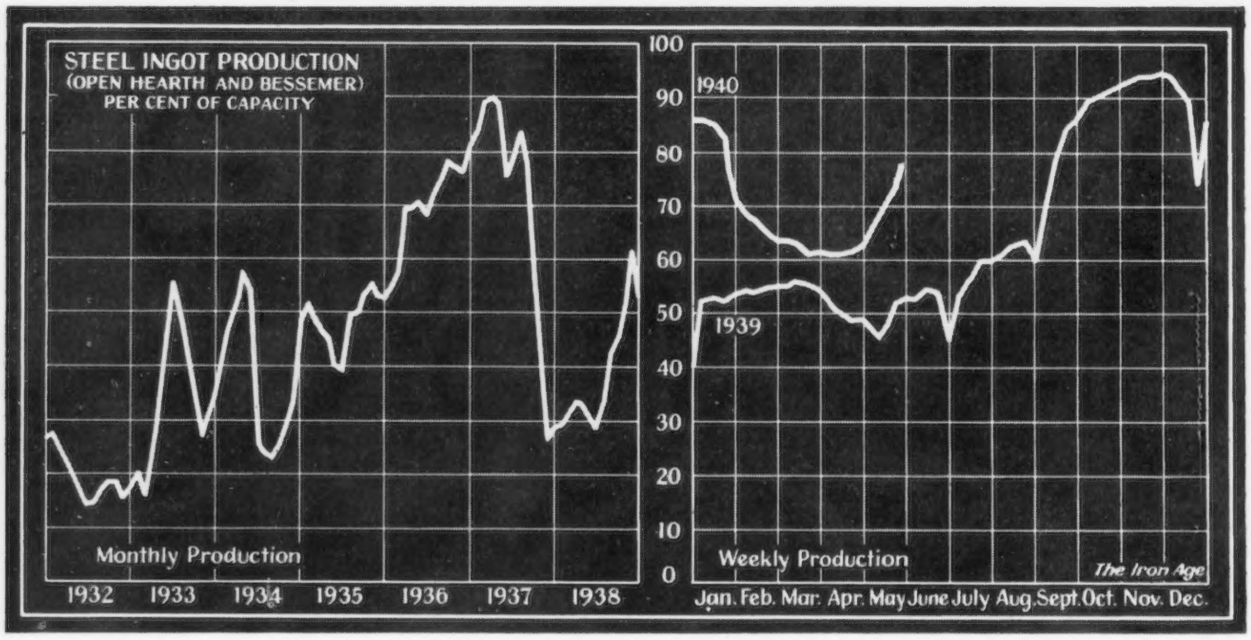
The generally cautious attitude ruling in the manufacturing industry is illustrated by the fact that the value of manufacturers' inventories in April, after adjustment for seasonal changes, was unchanged from March (see accompanying graph). Since January there has been virtually no change in the inventory situation. Inventories of non-ferrous metals in the month were slightly below March, while stocks of iron and steel stocks were unchanged. Slight gains were shown in the machinery makers' stocks.

This static situation in inventories is particularly significant in view of a 10 per cent gain in new orders received by manufacturers, as reported by the National Industrial Conference Board.

Production of electric energy from all sources in April (see accompanying graph) showed a slight improvement over March on a daily basis. Total production for the month was 11,192,530,000 kw-hr. On a daily basis output was 373,084,000, as compared with 371,329,000 in March.

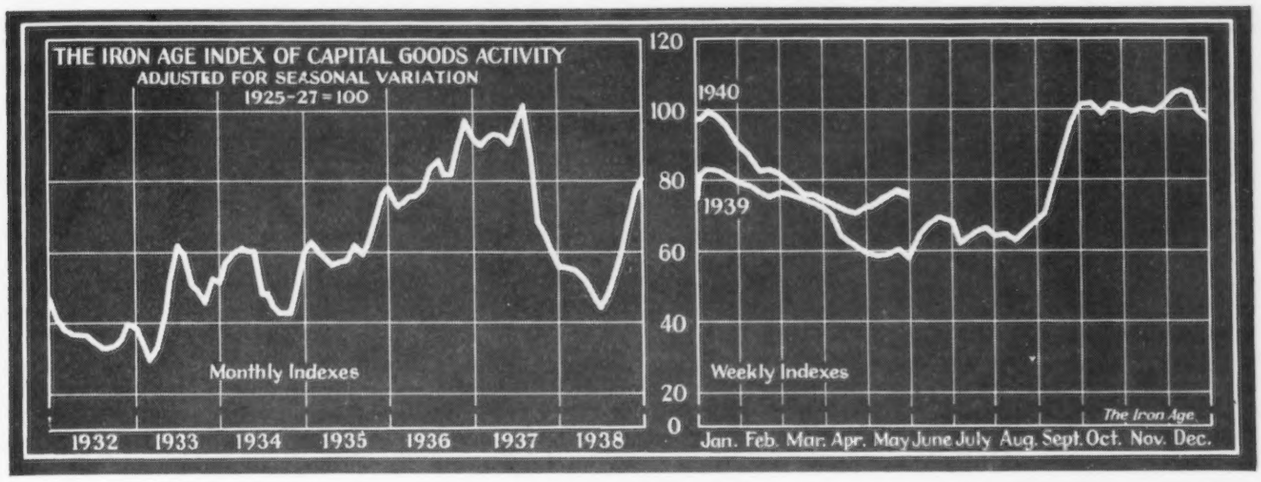
The chief increases in April were in the predominantly manufacturing districts as New England, Middle Atlantic and East North Central states. Several of the Southern districts showed reduced output in the month. The proportion of total power generated by water power, for public use, increased to 41 per cent in April from 35 per cent in March.

Steel Output Passes 80-Per Cent Mark



District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
	Current Week	81.0	85.5	73.0	80.0	79.0	94.0	91.0	79.0	84.5	74.0	71.0	67.0	50.0	**80.5**
	Previous Week	73.0	75.0	65.0	76.5	74.0	76.5	95.0	81.5	81.5	75.0	71.0	64.5	48.0	**74.0**

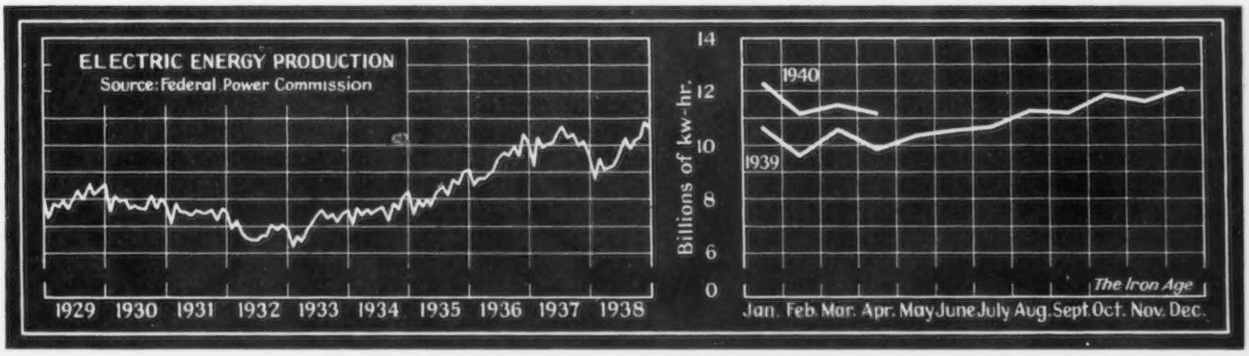
Drop in Automobile Output Lowers Capital Goods Index



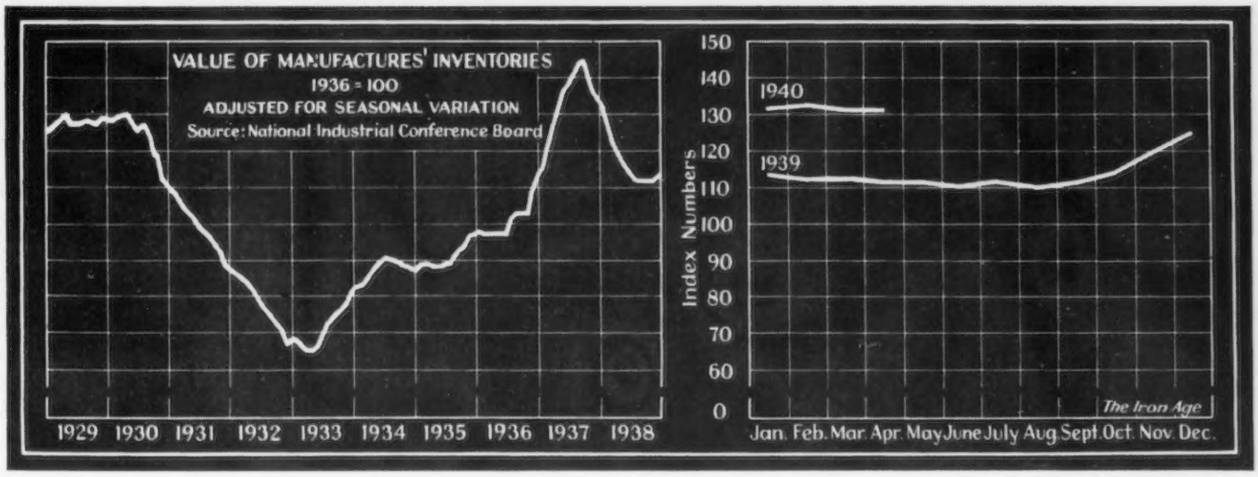
Components ▼ Week Ended ➤	June 1	May 25	May 4	June 3 1939	June 1 1929
Steel ingot production[1]	104.1	96.6	81.3	69.8	131.1
Automobile production[2]	66.2	82.8	82.3	33.8	109.9
Construction contracts[3]	52.9	51.4	54.8	70.2	125.2
Forest products carloadings[4]	61.4	61.6	59.6	52.7	111.2
Pittsburgh output and shipments[5]	91.0	89.2	83.8	63.0	124.4
COMBINED INDEX	75.1	76.3	72.4	57.9	120.4

Sources: [1] THE IRON AGE; [2] Wards Automotive Reports; [3] *Engineering News-Record*; [4] Association of American Railroads; [5] University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ended May 25. Other indexes cover the week of June 1.

April Electric Energy Output Up Slightly on Daily Basis



Manufacturers' Inventories Unchanged in April



Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

Steel Operations

. . . Ingot output advances two and a half points to 80½%

For the sixth consecutive week operations of the steel industry have gained. This week's rate is estimated at 80½ per cent, a gain of two and a half points over the estimated 78 per cent for last week.

Nearly all districts have shared in the improvement. A loss at Detroit is the only setback anywhere. PITTSBURGH is at 81 per cent, up three points; CHICAGO is at 85½ per cent, a gain of two and a half points; the YOUNGSTOWN rate is 73 per cent, five points up; EASTERN PENNSYLVANIA is a point higher at 80 per cent; BUFFALO has made a sharp jump to 94 per cent from 79½ per cent last week, and the SOUTHERN OHIO district is at 74 per cent compared with 70½ per cent last week.

Further gains seem to be in order as mills attempt to roll and ship by June 30 the heavy orders for sheets and strip specified against recent low-priced commitments.

New Business

. . . Bookings in May From 50 to 100% over April's

Total steel bookings at PITTSBURGH in May ran in some cases double the amount booked in April and, although this experience was not general, considerable improvement was shown in all instances. The volume of incoming specifications in the past week approximates a rate capable of supporting 85 to 90 per cent of capacity. Mill backlogs are increasing, shipments are behind incoming business, and, despite the fact that some producers are rapidly building up supplies, total production in the district is not ahead of fresh order volume. Export demand shows promise of further increases from the Allies. An unstated, though large, tonnage of French shell steel is now in the "hot" stage and may be placed momentarily.

Chicago bookings during May showed a tremendous improvement over the previous month, the total amounting to almost double the April volume in some offices. In no case was the betterment less than 50 or 60 per cent. All products participated in this movement with semi-finished, sheets and strip, and merchant bars most prominent. Sheet specifications against commitments made at the low prices were still being received early this week but, unless an extension of the June 30 deadline is made, it is doubtful if many more will come in.

In the case of at least one CHICAGO sales office, some low-priced sheets are being scheduled for delivery into the first half of July, but this is not at all general and no delivery has been promised past July 15. Rolling schedules at sheet mills are such now that within a very few days they will be entirely filled for the quarter.

Agricultural machinery manufacturers and farm and industrial tractor plants have been actively specifying hot rolled bars in the past week. In some offices bar tonnage exceeds that of sheets and strip. Non-integrated mills are the largest buyers of semi-finished materials, although it is understood that some export business has been received in this district.

It is probable that a fairly large proportion of the increase in business last month is due to the feeling among consumers that stocks should be built up at this time. Several large orders for tin plate have been received within the past week and operations at CHICAGO tin mills will continue good for some time. A substantial increase in the volume of small residential construction in the Middle West has been reflected in increased demand for pipe, nails and structural material.

At Cleveland and Youngstown, where aggregate new bookings during May were the best of any month since last fall, every indication points to continued improvement. While principal producers in these two districts up to the present have not shared the heavy orders for semi-finished steel distributed directly by the Allies, their participation in future business appears likely. At the same time benefit will be received from diverted domestic requirements. Even without direct Allied buying, export markets are now accounting for 12 to 15 per cent of some Cleveland producers' total bookings, against 6 to 9 per cent a few months ago.

Consumers are showing more unanimity toward maintaining well balanced stocks. One factor influencing this decision is realization that producers will put their raw steel into the best profit making products.

The demand for alloy steel already is far ahead of capacity and will be intensified when the United States rearmament program begins in earnest. Alloy steel is used for airplane crankshafts, airplane motor cylinders, bolts and nuts, machine tools and light armor plate among countless other applications. Stainless steel requirements are very strong, adding to the difficulties of alloy producers in meeting demand. In Ohio, where alloy capacity has been greatly enlarged during the past year, delivery promises now range from 12 to 16 weeks and are going backward steadily. Talk of establishing priority ratings on orders is being heard.

Coke making facilities are engaged to the limit at many steel plants and some companies are buying on the open market.

The peak of the drive for specifications on low-priced sheet commitments was reached in the past week in PHILADELPHIA, resulting in a substantial improvement in total business, as compared with the preceding week. It is expected that in coming weeks, sales will show a tendency to level off as the weekly volume will be almost entirely dependent upon strictly new business. The volume of the low-priced blanket orders covered by specifications varies from 60 to 80 per cent. All sellers insist that such commitments as are not now covered by rolling instructions will be cancelled. Warehouses and fabricators are ordering more freely of late and tin plate specifications have risen slightly over the past two weeks.

Pig iron demand for third quarter shipment was very active during the week, and it now appears that most consumers have covered the coming quarter's needs. District shipbuilders have increased their working schedules, but releases are still only moderate. Railroads are conspicuous by their continued absence from the market.

Definite results from the national defense program are not clearly discernible on the Pacific Coast; however, it is generally expected that further military construction, already the major factor in the construction steel market, will provide substantial construction tonnage. Although some California plants have been participating in the Army's "educational order" program, a survey of the Coast industrial picture would undoubtedly show that aircraft rather than ordnance manufacture will comprise the far West's chief national defense activity.

Prices

. . . June 30 deadline on sheets and strip imperiled by heavy specifications

At the rate some mills are still accepting specifications against low priced sheet and strip commitments, the June 30 deadline will either take on an exceptionally elastic quality or else time will stand still while deliveries are made. There have been no fresh strip orders taken since May 1 at the bargain prices, but the volume of specifications against prior low-priced commitments has been substantial and they are not all in yet despite repeated warnings that shipments after the end of this month will be invoiced at current published prices. Whether this drastic action will be taken remains to be seen. It is expected, however, that some of the steel companies will forego the jamming of order books with low-priced flat rolled tonnage and cash in on firm priced steel products other than sheets and strip.

Pig Iron

. . . . Domestic buying heavy in May; shipments to Allies increase

May bookings were the heaviest of any month since last fall in most districts and fear of tighter supplies has encouraged buyers who have not already covered their requirements for the next few months to take such action. Still higher steel melting schedules, with a possibility that production will reach full capacity, and a strengthening scrap market continue to be important factors.

Chief change in the export situation the past week is an easing of shipping difficulties, permitting a stepping-up in the movement of metal abroad, particularly to the Allies.

Two more blast furnaces have been blown in at PITTSBURGH, one more at BUFFALO and one more at CHICAGO. At CLEVELAND and YOUNGSTOWN the buying wave has assumed wide proportions. Demand at PITTSBURGH has picked up sharply, reflecting in part low supplies at consumer plants. CHICAGO sellers look for June shipments to exceed May, and find foundry coke movement has improved but slightly.

The buying wave from domestic purchasers in the NEW YORK area has tapered somewhat but export sales are increasing. Heavy demand at PHILADELPHIA probably reached its peak the past week, with most consumers covered on potential third quarter requirements. Buying at BOSTON shows moderate improvement while CINCINNATI reports melters continuing to contract actively for the third quarter and foundry operations rising slightly. May shipments in the ST. LOUIS area are estimated at between 20 and 25 per cent ahead of April.

CHICAGO sellers are taking orders for third quarter at unchanged prices.

Iron Ore

. . . Lake Superior movement to June 1 was 7,743,196

Shipments of Lake Superior iron ore from upper Lake ports for the current season up to June 1, totaled 7,743,196 gross tons, an increase of 4,084,945 tons from the corresponding part of 1939 season, but considerably below the 13,814,411 tons moved up to June 1, 1937. The latest report of the Lake Superior Iron Ore Association, Cleveland, shows that iron ore shipments in May this year totaled 7,274,024 gross tons, an increase of 3,672,571 tons over a year ago.

Railroad Buying

. . . Substantial equipment program expected to develop soon

Missouri Pacific has ordered 200 stock cars from American Car & Foundry Co., 30 hopper cars from Mt. Vernon Car Co., two streamlined passenger cars from St. Louis Car Co., and one streamlined diesel-electric passenger locomotive from Electro-Motive Corp. This road has also purchased five diesel-electric switchers, in addition to the six reported in THE IRON AGE on May 30. These five switchers were distributed as follows: two to General Electric Co., and one each to Porter Locomotive Works, Daven-

Weekly Bookings of Construction Steel

Week Ended →	June 4, 1940	May 28, 1940	May 7, 1940	June 6, 1939	Year to Date 1940	Year to Date 1939
Fabricated structural steel awards	16,600	18,000	11,400	21,900	327,280	436,025
Fabricated plate awards	5,005	4,030	310	2,990	68,040	74,800
Steel sheet piling awards	0	250	0	175	16,540	23,180
Reinforcing bar awards	9,450	5,800	4,220	7,800	184,050	211,345
Total Letting of Construction Steel	31,055	28,080	15,930	32,865	595,910	745,350

port Locomotive Works and Whitcomb Locomotive Co.

Pittsburgh & Lake Erie is taking bids on 3200 tons of car parts to be used in the rehabilitation of equipment at their own shops. Virginian Railway on June 5 will take bids on 1080 55-ton hopper car bodies and 500 new 55-ton hopper cars. It is not definite as to whether the latter will be made in the railroad's own shops or will be let to car builders.

Belief is growing that a substantial railroad equipment program is in the making and may be launched within the near future. Certainly the present rate of industrial activity and that expected later in the year will be a considerable strain on existing equipment.

American Car & Foundry Co. has been authorized by the I.C.C. to build 40 fusion-welded tank cars for caustic soda solution transportation. Donora Southern has awarded 30 gondola cars to Magor Car Corp.

Structural Steel

. . . Awards of 16,000 tons include some defense projects

Fabricated structural steel awards declined to 16,600 tons from 18,000 tons last week. Sizable lettings are 2500 tons at Seattle, Wash., for a new building for the Boeing Aircraft Co.; 2200 tons at Hartford, Conn., for the National Fire Insurance Co. building; 2000 tons for a National Guard drill hall in Washington, and 1200 tons for an Army hangar at Fairbanks, Alaska.

New structural steel projects at 20,100 tons are slightly lower than a week ago, with the bulk of inquiries in the East.

Semi-Finished Steel

. . . Heavy tonnages, both domestic and export, have been placed

Order volume in the past two weeks, because of export and domestic demand, has been at record heights as consumers attempt to build up supplies in an effort to forestall shortages later in the year. Associated with the general drive to get steel into consumers' plants has been the heavy ordering by non-integrated sheet and strip makers who are rushing finished sheet and strip steel business to completion to meet the June 30 deadline.

Carnegie-Illinois Steel Corp. has posted prices on basic open hearth shell steel. To the base prices are added chemical, cutting and quantity extras, and the prices shown below are for 1000-ton lots or more of a size and section. This grade covers hot rolled sections used in making shells such as rounds, round cornered squares and special sections.

F.o.b Pittsburgh and Chicago
3 in. to 8 in. exclusive $54.00 a gross ton
8 in. to 12 in. exclusive $52.00 a gross ton
12 in. to 18 in. exclusive $54.00 a gross ton
18 in. and over $56.00 a gross ton

At CLEVELAND, where mills have not yet enjoyed spectacular awards from the Allies, semi-finished producers hold large backlogs, due to greatly improved domestic order volume.

Therm-O-flake
INSULATION BRICK

One of lightest insulation brick available—(about one pound each).
Has low thermal conductivity, and is most economical for efficient insulation.
Can be compacted without breaking and cuts easily.
Especially valuable for back up work behind fire brick walls.
Acts as expansion cushion between furnace walls and binding structure.

Write for Information and Prices

Other Therm-O-flake Products
Made from Exfoliated Vermiculite
Granules - Brick - Block - Concrete

Illinois Clay Products Company
JOLIET, ILL.

May was a big month for producers of semi-finished steel at CHICAGO. Some mills reported semi-finished their best individual item with tonnage exceeding even that of sheets and strip.

Reinforcing Steel

. . . Price structure showing a semblance of strength

Reinforcing steel awards at 9450 tons include 2000 tons at Sitka and Kodiak, Alaska, for Navy air bases, and 1000 tons for a National Guard drill hall in Washington.

New reinforcing steel projects total 2550 tons with no inquiry of more than 450 tons.

Sheets and Strip

. . . Specifications against low-priced commitments have expanded

Bookings at PITTSBURGH in the past week expanded further as consumers rush in specifications. Some of the laggards have not yet furnished mills with shipping and size data despite the insistence that the June 30 deadline will be adhered to. Rolling mill schedules are fairly well filled up, although high speed strip mills could still roll out material for prompt shipment. Some mills still have some room in cold rolling departments. A firm stand on acceptance of specifications against low priced tonnage will have to be taken soon if even a liberal interpretation of the deadline shipping date is realized.

Sheet producers at CHICAGO are still holding to the deadline of June 30, which has been set as the date beyond which low priced sheets will not be shipped.

In the past week CLEVELAND and YOUNGSTOWN consumers have responded with specifications very satisfactorily and most of them have requested quick shipment.

Following four active weeks of specifying against contracts, sheet buyers in the NEW YORK area are practically out of the market for the moment.

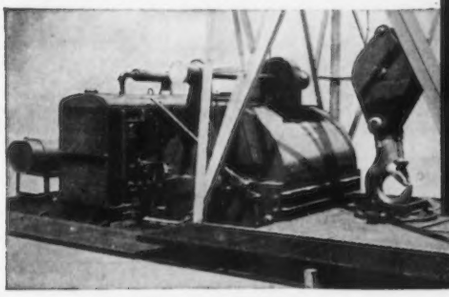
New business in the PHILADELPHIA area is expected to level off in coming weeks as the peak of the drive for rolling instructions on low-priced material passes. Between 60 to 80 per cent of this material has been definitely specified and sellers insist that material not covered by specifications will be cancelled. Some delivery dates are lengthening.

Warehouse Business

. . . Philadelphia distributers reduce prices on galvanized sheets

Quotations on galvanized sheets in PHILADELPHIA were lowered approximately $5 a ton on May 24. The new prices are 4.50c. for one to nine bundles; 4.25c. for 10 to 24 bundles and 4c. for 25 to 49 bundles. Demand for warehouse items in Philadelphia increased sharply in May, with all lines sharing in the improvement. The month's total sales were well in excess of May, 1939, and were the best of any month so far this year. Most sellers entered June with a fairly large carry-over of orders.

Typical of housings and structural work fabricated with Genex is this portable drill rig built by Brauer Machine & Supply Co., Oklahoma City.



Easy to use, Genex Electrodes are often employed in making small units to replace castings, such as this one built by The Dorr Company, Denver.

KEEP YOUR WELDING COSTS DOWN WITH MUREX

GENEX

The **SPEEDY, EASY-TO-USE ALL-POSITION ELECTRODE FOR STRAIGHT POLARITY OR A.C. WELDING.**

Designed for welding in any position . . . flat, vertical, or overhead . . . and to readily bridge gaps where assembly fit-up is imperfect, Murex Genex Electrodes have several outstanding features which make them highly economical in operation. They are used at higher currents, which steps up welding speed. They burn with less spatter; less smoke, and so provide better visibility of the arc and the molten pool of weld metal. The slag is easy to remove and does not cling to the edges of the weld, even on heavy fillets.

In marine work, Genex speeds work where lap welds are required on bulkheads and hull plating.

Send for complete information, or ask to have a representative call and show you what these electrodes can do.

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MUREX HEAVY COATED Electrodes
A COMPLETE LINE FOR EVERY WELDING APPLICATION

Investigate Thermit Welding, too—in use since 1902 for heavy repair work, crankshafts, etc.

Replacement of stocks by warehouse interests is being done with the possibility of establishment of priority for Government work.

May business in the metropolitan New York area was also the highest of any month this year.

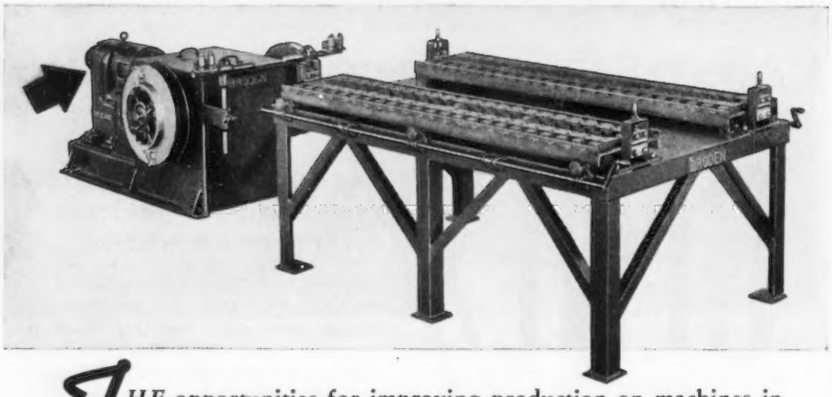
Warehouse sales at PITTSBURGH last month were only slightly ahead of the volume booked in April and the improvement in demand nowhere near approximated the experience of steel mills.

DETROIT warehouse business was at a substantial level in May but did not change much from earlier in the spring. The outlook for June is not clearly defined but as a whole the month is expected to be an improvement over the spring months. This anticipation is based in part on probable activity generated by preparations for defense. Prices have been steady during the last month with the exception of galvanized sheets which took a 20c. drop during the last week of May, bringing this item to $4.64 per 100 lb. in the metropolitan area.

At CLEVELAND May order volume proved numerically better but with total tonnage practically on a par with April. Specialized warehouses are enjoying brisk demand for alloy steel.

May sales at CHICAGO were only slightly higher than April but the final week of the month showed a sharp increase and was the best week of the year to date.

REEL SPEEDS ADJUSTED AS DIAMETER BUILDS UP—WITH *Reeves Speed Control*



THE opportunities for improving production on machines in the metal working industries with REEVES Speed Control are innumerable. Here, for example, a REEVES Vari-Speed Motodrive regulates the speed of the winding reel so accurately as diameter builds up that constant, uniform speed is maintained on metal strip being pulled through a Broden filing machine to take off the sharp edges of slit strip. This is a tonnage machine in a production set-up operating at a much faster rate of speed and producing a higher quality. Any width of strip, from 1/8" to 3/4", can be drawn through the filer at speeds ranging from 300 to 900 r.p.m. Note the high speeds obtainable by use of REEVES.

It is easy to select the exact type and size of REEVES Speed Control required for any specific application from the wide range of sizes and models of the three basic REEVES units. Catalog G-397 illustrates and describes all these units, and scores of installations. Write for it.

REEVES PULLEY COMPANY, *Dept. I,* **COLUMBUS, INDIANA**

REEVES SPEED CONTROL

Plates

. . . Improvement in buying noted in several centers . . . . . .

Plate specifications at PITTSBURGH have again shown an increase in the past week due to domestic and foreign requirements. A substantial increase in plate requirements is expected as soon as the naval armament program gets under way at full speed.

For the first time in several months, independent producers in EASTERN PENNSYLVANIA in the past reported a substantial improvement in volume of incoming business. This demand rests on a diversified base, with the warehouses and fabricators especially active. In several instances the week's total business was the best of any week so far this year and resulted in a sharp increase in rolling mill operations. Floor, hull and boiler plates are being ordered by Canada in fairly heavy volume.

Tin Plate

. . . Operations up slightly at 75% . . . Cold Reducing mills busy

Tin plate operations this week are estimated at 73 per cent, up one point from a week ago. Producers look for a slowly expanding rate of activity over the next few months at least. Seasonal factors are still at work and reliable sources indicate the stocks of canned food in this country today are not as great as they were a year ago. This fact is expected to have considerable bearing on tin plate demand later in the year as any large scale armament program will certainly take in the question of canned foods.

Tubular Goods

. . . Miscellaneous Line Pipe business has picked up

Oil country goods demand is still buttressed by requirements from neutral countries whose original source of supply has been cut off. Domestic orders are about on a par with a week ago as far as oil country goods is concerned, but there has been a further pick up in miscellaneous line pipe business. Line pipe prices remain weak with little or no semblance of strength recently.

Merchant Bars

. . . Orders are expanding as hand-to-mouth buying disappears

Hot rolled bar business at PITTSBURGH continues on the upgrade. A considerable number of domestic bar users are ordering heavier than they were a month ago, in order to build up stocks and thus escape shortages, should they occur later in the year. Hand-to-mouth buying has disappeared and present-day market conditions are reminiscent of the "normal" times from 1923 to 1929 when consumers bought 60 to 90 days ahead. Alloy steel bars are in great demand and, as reported previously, mills are far behind in filling orders. Deliveries in some cases are extended as far as 10 to 12 weeks.

Wire Products

. . . Business is below level of industry as a whole

Total wire sales at PITTSBURGH are holding their own with a week ago. Forward buying by domestic consumers of wire and wire products is not proceeding at as rapid a pace as is the other steel markets.

At CLEVELAND, where May order volume was the best since last fall and double April bookings, the outlook for June is promising. Production and shipments are climbing, although still below the level of the entire steel industry.

May bookings at CHICAGO were well ahead of the previous month, with manufacturers' wire and merchant products contributing almost equally to the improvement.

Export Trade

. . . British and French to Expedite Purchase and Shipment of Steel

A British-French commission, consisting of men who have been responsible for supplying the armament industries of those countries with steel, arrived in the United States last Saturday and is holding conferences with executives of the American steel industry in an effort to expedite the purchase and shipment of steel to the Allies in sufficient quantities to replace the losses caused by the invasion of Belgium and Luxembourg.

The French steel inquiry covering about 140,000 tons of various steel products has been allocated.

AJAX
Here is a 1300 ton capacity solid frame forging press with Nelcy Steel Gears . . . 25% of the teeth, only those taking wear load, are Nelcy 10B flame hardened.
GEARS
FOR FORGING PRESSES • • •
SYKES HERRINGBONE — HELICAL
SPUR — BEVEL — MITRE
NATIONAL-ERIE
• CORPORATION •
ERIE, PA., U.S.A.

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Await Government Plans

Cleveland

• • • **Producers are hearing** some very large dollar figures mentioned in connection with estimated machine tool requirements for rearmament of the United States and for the Allies. The industry is well set up to fill these demands but many questions remain to be settled. Up to the start of this week very little of a definite nature had been learned as to exact plans of the Government. Conferences are continuing and should yield results soon. One question bothering some producers is what action to take upon machines paid for by nations which are now cut off or absorbed by Germany. It is understood a number of these machines are being held on docks in New York.

War Activity Predominates

New York

• • • As one dealer put it in the last week, practically all business in machine tools today is being done on a patriotic basis, or more specifically to further our own preparedness program or to help the Allies. While buying of machine tools on the part of the aircraft industry continues to predominate in this territory, it is expected that aircraft engine building expansion, large as it has been, will be greatly augmented. There is a large amount of inquiry from industrial firms who expect to share in Government war material orders, but the arsenals and Navy yards have yet to get out new lists on the 1941 budget, effective July 1. With Government contracts widely placed, pressure for priorities in shipment is increasing.

Russian buying has fallen off to a new low point in the last month, but Japanese buying continues at a high rate. British buying is at a high level, but French purchases are not in the volume of last fall when a whole year's business was placed in a couple of months.

Aviation Buying Plans Lags

Cincinnati

• • • **Machine tool** manufacturers report that both foreign and domestic demand continues to be brisk, with a slight edge in favor of the foreign business. Orders have not yet begun to develop in direct relation to the anticipated expansion in aircraft manufacture. Industries supplying parts and other fabricated materials to the airplane manufacturers, however, account for a substantial amount of the present domestic demand. Great Britain and France continue to be active on the export list.

Local factories continue to go at full capacity under present labor supply.

Chicago Orders Diversified

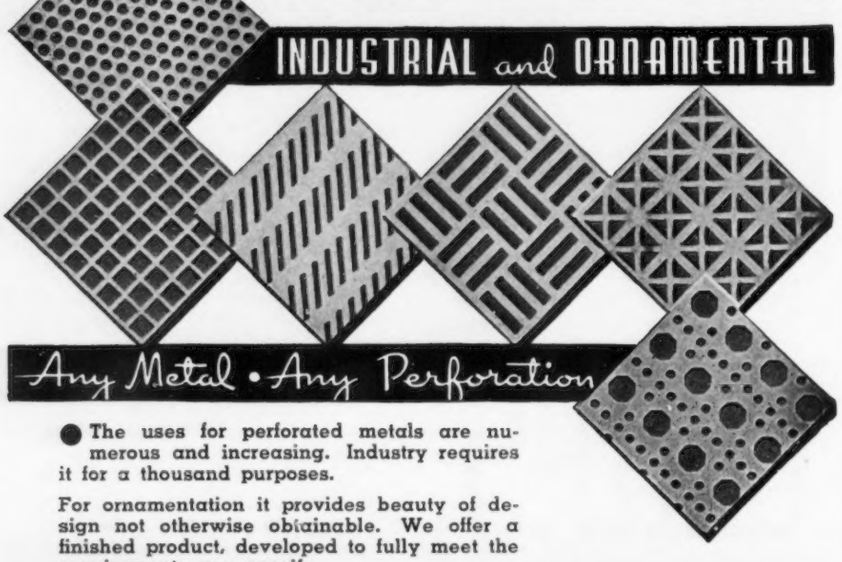
Chicago

• • • Local machine tool sales offices generally enjoyed a higher volume of business in May than in April. In some cases the increase was considerable. Both orders and inquiries are quite well diversified as to industries. Manufacturers of tractors and agricultural implements as well as some of the smaller tool and die shops have been in the market recently. In some offices there has been a noticeable increase in demand for larger machine tools and it is believed that these are either a direct result of Government or war orders or anticipation of such orders.

As if the war and the threats of extended congestion because of Federal orders were not enough to worry about, the Chicago machine tool trade is also plagued with the Illinois occupational tax of 3 per cent.

PERFORATED METAL

INDUSTRIAL and ORNAMENTAL



● The uses for perforated metals are numerous and increasing. Industry requires it for a thousand purposes.

For ornamentation it provides beauty of design not otherwise obtainable. We offer a finished product, developed to fully meet the requirements you specify.

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5657 FILLMORE STREET—CHICAGO, ILL.

New York Office, 114 Liberty Street

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, June 4—Europe was again the dominating factor in the nonferrous market in the past week. The intensified prosecution of the war was accompanied by a heavy demand for copper from the Allies. France closed last week for about 75,000 tons of ingot material at a price reported to be in the neighborhood of 11.25c., f.a.s., and England is negotiating for 25,000 tons, part of which has already been placed. The French purchase calls for delivery of 25,000 tons in September, October and November. Outside of these Allied purchases, the export market was quiet, with nearby metal this morning quoted at 11.50c., f.a.s.

The new foreign purchases further aggravated an already rather tight spot and nearby delivery situation and gave rise to some concern on the part of domestic onsumers of the red metal. This concern was reflected by fairly heavy buying toward the end of the week, reaching a peak of 24,400 tons over the week end. The heavy week end sales brought the total for the entire month up to 84,100 tons.

In the early part of the past week, smelters and resale interests were selling at from ⅛ to ¼c. below the producers' quotation of 11.50c. However, by the week end, all sellers were uniformly at 11.50c. per lb., delivered Connecticut Valley.

Zinc

Influenced partly by events in the copper market and partly by a heavier demand from both domestic and foreign sources, spelter quotations were raised 0.25c. on June 3 to 6.25c. per lb., East St. Louis. This increase, which was not wholly unexpected, found most consumers fairly well covered for the next two months at prices well below the new price. The past week's sales of prime Western metal amounted to 6338 tons, as compared with 4845 tons in the preceding week. Shipments in the past week were 6531 tons, or almost double the previous week's total. The bulk of the foreign demand was from England. While this demand involves bonded metal for the most part, this material must be smelted here. Domestic smelting facilities are at present operating at close to capacity, and it appears that this operation will probably prove to be the bottleneck to possible further expansion of zinc output in this country.

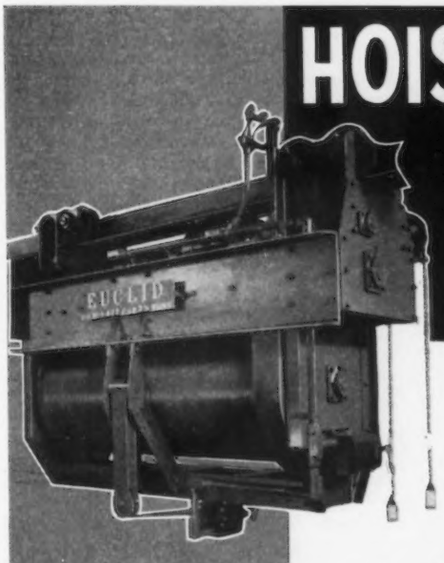
Lead

A fairly active demand for lead persisted throughout the past week and most sellers experienced no difficulty in disposing of daily quotas. Most of the interest centered on June positions, with little interest shown in July. June requirements at present are estimated to be close to 90 per cent covered, while July needs are about 15 to 20 per cent bought. Quotations were unchanged all week at 4.85c., St. Louis.

Tin

The possibility of interruption of supply routes continues to keep domestic consumers interested in nearby metal. Buying throughout the past week was in good volume, with demand far in excess of offerings. Largest call is for metal afloat or metal which will be loaded within the next two weeks for early August delivery. Quotations abroad advanced sharply during the week, but prices here showed only a moderate increase. Straits today was quoted at 55c. per lb., New York, for nearby delivery, as compared with 53.50c. a week ago. Cash standards in London were priced at £277 today, against £268 a week ago.

Non-Ferrous Metal Prices on Page 121.



HOISTS *for every purpose*

BUILT TO ONE HIGH STANDARD

HERE is a compact hoist with a 240 foot lift, for handling a pump at the bottom of a shaft 240 feet below the level of the ground.

Its design presented unusual problems because of limited headroom and exacting requirements as to hook approaches, etc.

The Euclid organization has been solving problems of this kind for a third of a century. This experience is at your disposal. Tell us your problem and we will work with you.

EUCLID *CRANES & HOISTS*

THE EUCLID CRANE & HOIST CO.
1361 CHARDON RD. . . . EUCLID, OHIO

Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

Another large mill purchase at Chicago at 50c. above the level of a similar sale the week before has boosted steel making grades 50c. there. Sales of No. 1 steel at $19 at both Pittsburgh and Philadelphia are also at a 50c. advance over last week's quotations, although by quoting a flat $19 at Pittsburgh this week, the average has advanced only 25c. These moves take the composite price up 41c. to $18.58, new high for 1940 and equal to the level prevailing on Nov. 28, 1939. The composite has recovered $2.04 from the low of $16.54 of March 19, but has a long way to go before reaching last October's high of $22.50. Both sellers and buyers are desirous of preventing a runaway market, however, despite evidence of strength all over the country. Greatest strength is seen at Youngstown, where No. 1 steel is $1 higher. Prices at Cleveland and Buffalo are up 50c. Dealer buying prices, where quoted, are generally higher, except at St. Louis where mill interest is lagging. Export buying prices are unchanged owing to the restricted flow of material, largely consigned to Great Britain. The amount of scrap being currently exported is so low in fact that proposed Congressional restrictions on exports should have little effect upon the domestic market.

Pittsburgh

Even though areas west of this district are taking scrap from Pittsburgh points, activity here is about on a par with a week ago but the market is definitely stronger. With sales into consumption being made at $19 a ton, with some brokers paying this price to cover, and with consumers unable to buy at $18.50, No. 1 heavy melting is quoted this week at a flat $19 a ton. As pointed out before, two of the largest steel making plants here do not rely on open market purchases of scrap for their requirements. Otherwise, current prices would probably be much higher. Blast furnace grades are stronger because of the influence of fresh orders in a nearby area.

Chicago

A quantity of No. 1 steel, estimated at between 5000 and 10,000 tons was purchased last week for $18 a gross ton by one of the smaller mills in this district. With prospects almost certain for prolonged hostilities in Europe and maintenance of current high mill operations, this market reflects nothing but strength. Brokers are buying from dealers at an average price of $17.25.

Philadelphia

Prices in this market are still in a very fluid condition and accurate appraisal of present market prices is difficult. However, small tonnages of No. 1 steel have been sold in several directions at $19, while brokers are paying $18.50, and in some cases as high as $18.75, in covering. The recent rise in district open-hearth activity has increased consumer interest in the market, but buyers are still hesitant about making commitments in an effort to avoid pushing the market up. Dealers are equally cautious in accepting orders because of the difficulty of covering.

Youngstown

At the start of this week scrap was reported coming out more freely here, spurred by a definitely stronger market. One mill was even said to be attempting to apply the brakes on shipments temporarily. Operations have crossed the 70 per cent mark in the Valley. No. 1 heavy melting is quoted at $193.50 to $20 per ton, up $1.

Cleveland

Open-hearth and blast furnace grades are stronger here this week. No. 1 is quoted at $18.50 to $19 per ton, up 50c., and mixed borings and turnings are up $1 to a range of $11.50 to $12. The Great Lakes districts are encountering some unusual developments. Canadian demand is strong at some points. Detroit is reported buying in places seldom tapped hitherto.

Buffalo

Values continued their uptrend this week when two small sales were made to district consumers which placed the range of No. 1 heavy melting steel at $18.50 to $19. The price of No. 2 steel is advanced to $16.50 to $17, with the usual differential in other allied grades. Demand for cast scrap continues strong.

St. Louis

The scrap iron market in St. Louis is strong, with prices unchanged. A small tonnage of specialties was sold during the week. However, mills are disinclined to buy except at prices lower than brokers will accept, because of the uncertainty of conditions. Country dealers are holding on to their supplies in the hope of getting higher prices, and comparatively little is coming in. Railroad lists: New York, Chicago & St. Louis, 1600 tons; Wabash, 2600 tons; Alton, 875 tons, and Ann Arbor, 100 tons.

Cincinnati

Old materials strength in other markets carried the district market upward the current week. In fact, some dealers indicate that the attractive prices in the Valley district are taking some material out of the local market. Dealers continue to bid aggressively for available material, but are holding yard supplies for anticipated further increase in the local market. Mills are reported taking contract material, but so far new contracting has been desultory.

Birmingham

Greater vitality in the market elsewhere, plus betterment in steel business, caused an advance of $1 in Nos. 1 and 2 scrap in this area, effective June 1. These grades jumped from $15 to $16 for No. 1, while No. 2 went from $14 to $15.

Detroit

Automotive lists, although light in tonnage, moved fast in the Detroit market at month end with considerable tonnages moving out of town. Scrap prices are subject to considerable leeway in many cases. One broker is offering 50c. a ton more on most items this week, although others insist that they can buy at the level of last week. However, scrap production is almost to the vanishing point and dealers' yards either hold no more scrap, or the owners are refusing to sell. The principal consumer in the area apparently has not decided to buy yet, at least not in large tonnages.

New York

Broker buying for export continues very light and prices are unchanged. Daily it becomes more doubtful whether any of the recent Italian contract tonnages will be shipped, and practically no material other than what is on hand is being accumulated for this purpose. Current shipments are to the United Kingdom, all in the nature of berth space tonnages rather than in full vessels, which appear no longer available for scrap movement alone.

Boston

Steel turnings have advanced an additional 25c. a ton. Ordinary turnings are now $7.15 a ton on cars and short turnings $7.65. Otherwise scrap for domestic delivery is unchanged in price. Modest tonnages of steel turning, mixed borings and turnings and bundled skeleton are moving to Pennsylvania mills, and Providence reports loadings of compressed bales on motor barges for domestic consumption.

Toronto

Steadily expanding demand from mills and other consumers is responsible for feverish activity in Canadian scrap markets. Despite the fact that local dealers are obtaining new supplies at a record-breaking pace, they are barely able to keep pace with consumers' demands and Canadian supplies recently have been augmented by large imports from the United States.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$19.00
Railroad heavy mltng.	$20.50 to 21.00
No. 2 heavy melting	17.50 to 18.00
Railroad scrap rails	20.50 to 21.00
Rails 3 ft. and under	23.00 to 24.00
Comp. sheet steel	19.00
Hand bundled sheets	18.00
Heavy steel axle turn.	**16.50 to 17.00**
Machine shop turnings	13.00 to 13.50
Short shov. turnings	14.50 to 15.00
Mixed bor. & turn.	11.00 to 11.50
Cast iron borings	11.00 to 11.50
Cast iron carwheels	**20.00 to 20.50**
Heavy breakable cast.	**16.00 to 16.50**
No. 1 cupola cast	19.00 to 19.50
RR. knuckles & coup.	23.50 to 24.50
Rail coil springs	23.50 to 24.50
Rail leaf springs	23.50 to 24.50
Rolled steel wheels	23.50 to 24.50
Low phos. billet crops	23.50 to 24.50
Low phos. punching	22.50 to 23.00
Low phos. heavy plate	21.50 to 22.00
Railroad malleable	23.50 to 24.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$19.00
No. 2 hvy. mltng. steel	17.50
Hydraulic bund., new	19.00
Hydraulic bund., old	15.00 to 15.50
Steel rails for rolling	**20.50 to 21.00**
Cast iron carwheels	**20.50 to 21.00**
Hvy. breakable cast	19.50 to 20.00
No. 1 cupola cast	20.50 to 21.00
Mixed yard (f'd'y) cast	18.00 to 18.50
Stove plate (steel wks.)	16.00 to 16.50
Railroad malleable	21.00 to 22.00
Machine shop turn.	12.00 to 12.50
No. 1 blast furnace	10.50 to 11.00
Cast borings	10.50 to 11.00
Heavy axle turnings	14.50 to 15.00
No. 1 low phos. hvy.	23.00 to 23.50
Couplers & knuckles	23.00 to 23.50
Rolled steel wheels	23.00 to 23.50
Steel axles	**22.50 to 23.00**
Shafting	23.00 to 23.50
Spec. iron & steel pipe	16.50 to 17.00
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$17.50 to $18.00
Auto. hvy. mltng. steel alloy free	16.50 to 17.00
No. 2 auto steel	14.25 to 14.75
Shoveling steel	17.50 to 18.00
Factory bundles	17.00 to 17.50
Dealers' bundles	15.50 to 16.00
No. 1 busheling	16.50 to 17.00
No. 2 busheling, old	8.00 to 8.50
Rolled carwheels	19.50 to 20.00
Railroad tires, cut	20.00 to 20.50
Railroad leaf springs	19.00 to 19.50
Steel coup. & knuckles	19.50 to 20.00
Axle turnings	15.50 to 15.75
Coil springs	20.50 to 21.00
Axle turn. (elec.)	16.50 to 17.00
Low phos. punchings	19.00 to 19.50
Low phos. plates 12 in. and under	19.50 to 20.00
Cast iron borings	11.00 to 11.50
Short shov. turn.	11.75 to 12.25
Machine shop turn.	11.25 to 11.75
Rerolling rails	21.50 to 22.00
Steel rails under 3 ft.	19.25 to 19.75
Steel rails under 2 ft.	21.50 to 22.00
Angle bars steel	20.00 to 20.50
Cast iron carwheels	18.75 to 19.25
Railroad malleable	21.25 to 21.75
Agric. malleable	14.75 to 15.25
	Per Net Ton
Iron car axles	23.50 to 24.00
Steel car axles	22.50 to 23.00
Locomotive tires	15.00 to 15.50
Pipes and flues	11.50 to 12.00
No. 1 machinery cast	16.75 to 17.25
Clean auto. blocks	18.00 to 18.50
No. 1 railroad cast	15.00 to 15.50
No. 1 agric. cast	13.50 to 14.00
Stove plate	11.50 to 12.00
Grate bars	11.50 to 12.00
Brake shoes	11.50 to 12.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$19.50 to $20.00
No. 2 hvy. mltng. steel	18.50 to 19.00
Low phos. plate	21.50 to 22.00
No. 1 busheling	18.75 to 19.25
Hydraulic bundles	19.00 to 19.50
Machine shop turn.	12.00 to 12.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$18.50 to $19.00
No. 2 hvy. mltng. steel	17.50 to 18.00
Comp. sheet steel	18.00 to 18.50
Light bund. stampings	15.00 to 15.50
Drop forge flashings	17.50 to 18.00
Machine shop turn.	11.00 to 11.50
Short shov. turn.	11.50 to 12.00
No. 1 busheling	17.75 to 18.25
Steel axle turnings	17.00 to 17.50
Low phos. billet and bloom crops	22.50 to 23.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
No. 2 busheling	11.50 to 12.00
No. 1 cupola cast	21.00 to 21.50
Railroad grate bars	**14.25 to 14.75**
Stove plate	**14.25 to 14.75**
Rails under 3 ft.	22.00 to 22.50
Rails for rolling	20.00 to 20.50
Railroad malleable	21.50 to 22.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$18.50 to $19.00
No. 2 hvy. mltng. steel	16.50 to 17.00
Scrap rails	20.50 to 21.00
New hvy. b'ndled sheets	16.50 to 17.00
Old hydraul. bundles	14.50 to 15.00
Drop forge flashings	16.50 to 17.00
No. 1 busheling	16.50 to 17.00
Machine shop turn.	11.50 to 12.50
Shov. turnings	12.50 to 13.00
Mixed bor. & turn.	11.00 to 11.50
Cast iron borings	11.00 to 11.50
Knuckles & couplers	21.50 to 22.00
Coil & leaf springs	21.50 to 22.00
Rolled steel wheels	21.50 to 22.00
No. 1 machinery cast	20.00 to 20.50
No. 1 cupola cast	18.50 to 19.00
Stove plate	14.50 to 15.00
Steel rails under 3 ft.	23.00 to 23.50
Cast iron carwheels	18.50 to 19.00
Railroad malleable	21.50 to 22.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$15.75 to $16.25
No. 1 hvy. melting	15.25 to 15.75
No. 2 hvy. melting	15.25 to 15.75
No. 1 locomotive tires	16.25 to 16.75
Misc. stand. sec. rails	17.50 to 18.00
Railroad springs	**16.25 to 16.75**
Bundled sheets	10.50 to 11.00
Cast bor. & turn.	6.25 to 6.75
Machine shop turn.	7.50 to 8.00
Heavy turnings	10.50 to 11.00
Rails for rolling	19.00 to 19.50
Steel car axles	19.50 to 20.00
No. 1 RR wrought	12.00 to 12.50
No. 2 RR wrought	14.00 to 14.50
Steel rails under 3 ft.	19.00 to 19.50
Steel angle bars	18.00 to 18.50
Cast iron carwheels	16.00 to 16.50
No. 1 machinery cast	16.75 to 17.25
Railroad malleable	17.50 to 18.00
Breakable cast	16.00 to 16.50
Stove plate	12.00 to 12.50
Grate bars	10.50 to 11.00
Brake shoes	11.75 to 12.25

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	$14.50 to $15.00
No. 2 hvy. mltng. steel	13.00 to 13.50
Scrap rails for mltng.	19.50 to 20.50
Loose sheet clippings	9.25 to 9.75
Hydrau. b'ndled sheets	13.75 to 14.25
Cast iron borings	6.00 to 6.50
Machine shop turn.	7.00 to 7.50
No. 1 busheling	10.50 to 11.00
No. 2 busheling	4.75 to 5.00
Rails for rolling	21.00 to 21.50
No. 1 locomotive tires	16.00 to 16.50
Short rails	21.50 to 22.00
Cast iron carwheels	16.00 to 16.50
No. 1 machinery cast	18.50 to 19.00
No. 1 railroad cast	17.00 to 17.50
Burnt cast	10.50 to 11.00
Stove plates	10.50 to 11.00
Agricul. malleable	15.00 to 15.50
Railroad malleable	18.00 to 18.50
Mixed hvy. cast	15.75 to 16.25

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	$16.00
No. 2 hvy. melting steel	15.00
No. 1 busheling	14.00
Scrap steel rails	15.00
Steel rails under 3 ft.	16.00
Rails for rolling	16.50
Long turnings	5.00
Cast iron borings	7.50
Stove plate	10.00
Steel axles	18.00
No. 1 RR wrought	14.00
No. 1 cast	16.00
No. 2 cast	12.50
Cast iron carwheels	13.00
Steel car wheels	16.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting	$16.00 to $17.00
No. 2 heavy melting	15.00 to 16.00
Borings and turnings	10.00 to 11.00
Long turnings	10.25 to 11.00
Short shov. turnings	11.00 to 11.50
No. 1 cast	19.00 to 20.00
Automotive cast	19.00 to 20.00
Hvy. breakable cast	15.50 to 17.00
Stove plate	12.50 to 13.00
Hydraul. Comp. sheets	16.50 to 17.50
New busheling	15.50 to 16.50
Sheet clips	13.00 to 14.50
Flashings	15.00 to 16.00
Low phos. plate	17.50 to 18.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$14.50 to $15.00
No. 2 hvy. mltng. steel	12.50 to 13.00
Hvy. breakable cast	15.50 to 16.00
No. 1 machinery cast	17.50 to 18.00
No. 2 cast	14.00 to 14.50
Stove plate	12.00 to 12.50
Steel car axles	19.50 to 20.50
Shafting	19.50 to 20.50
No. 1 RR. wrought	14.50 to 15.50
No. 1 wrought long	13.00 to 13.50
Spec. iron & steel pipe	11.50 to 12.00
Rails for rolling	16.00 to 16.50
Clean steel turnings*	6.50 to 7.00
Cast borings*	6.50 to 7.00
No. 1 blast furnace	6.50 to 7.00
Cast borings (chem.)	10.00 to 11.00
Unprepared yard scrap	8.00 to 8.50
Light iron	6.00 to 6.50
Per gross ton delivered local foundries:	
No. 1 machin. cast	$18.00 to $19.00
No. 2 cast	17.00 to 17.50

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	$13.00 to $13.25
Machine shop turn.	7.15 to 7.65
Mixed bor. & turn.	5.15
Bun. skeleton long	10.40
Shafting	17.00 to 17.50
Stove plate	10.00 to 10.50
Cast bor. chemical	8.00 to 8.50
Per gross ton delivered consumers' yards:	
Textile cast	**$15.50 to $17.00**
No. 1 machine cast	**15.50 to 17.00**
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel	$13.75
No. 2 steel	12.75

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	$12.00	$12.00	$11.00
No. 2 hvy. mltng. steel	11.00	11.00	10.00
Bundles	10.00	10.00	9.00

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	$11.50	$11.00
No. 1 hvy. mltng. steel	11.00	10.50
No. 2 hvy. mltng. steel	9.75	9.25
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.25	6.75
Cast borings	6.75	6.25
Machinery cast	20.00	19.00
Dealers' cast	19.00	18.00
Stove plate	14.00	13.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel	$14.00 to $14.50
No. 2 hvy. mltng. steel	12.00 to 12.50
No. 2 cast	12.50 to 13.00
Stove plate	11.00 to 11.50
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel	$15.00 to $15.50
No. 2 hvy. mltng. steel	13.50 to 14.00
Rail (scrap)	15.00 to 15.50
Stove plate	8.00 to 8.25
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel	$17.75
No. 2 hvy. mltng. steel	16.25

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings decline to 16,600 tons from 18,000 tons last week; new projects are slightly lower at 20,100 tons; plate awards call for 5005 tons.

AWARDS

NORTH ATLANTIC STATES

2250 Tons, Hartford, Conn., National Fire Insurance Co., building, to Bethlehem Steel Co., Bethlehem, Pa.

2000 Tons, Washington, National Guard drill hall, to Fort Pitt Bridge Works Co., Pittsburgh, through Charles H. Tompkins Co., Washington.

530 Tons, W. Lynn, Mass., additional building for General Electric Co., to American Bridge Co., Pittsburgh.

330 Tons, Chester, Pa., Vocational High School, to Belmont Iron Works, Philadelphia.

310 Tons, Buffalo, Brost Motors, Inc., truck garage, to Buffalo Structural Steel Co., Buffalo.

285 Tons, Worcester, Mass., mill building, to American Bridge Co., Pittsburgh.

140 Tons, Carlstadt, N. J., warehouse for J. V. C. Terminal Corp., to an unnamed bidder.

110 Tons, Buffalo, garage for Buffalo Niagara Electric Co., to Bethlehem Steel Co., Bethlehem, Pa., through J. W. Cowper Co., Buffalo.

THE SOUTH

655 Tons, Dallas, Tex., assembly plant addition for Ford Motor Co., to Mosher Steel Co., Dallas.

185 Tons, Louisville, Ky., Deering press room, to Louisville Bridge & Iron Co., Louisville, through Strausck Construction Co.

170 Tons, Kaufman County, Tex., bridge, to North Texas Iron & Steel Co., Fort Worth, Tex.

120 Tons, Gilmer County, W. Va., bridge, to Wheeling Structural Steel Co., Wheeling, W. Va., through E. R. Mills.

100 Tons, Elizabethton, Tenn., high school, to Johnson City Foundry & Machine Co., Johnson City, Tenn.

CENTRAL STATES

560 Tons, St. Paul, Minn., Great Northern Railway Co. bridge repairs, to American Bridge Co., Pittsburgh.

296 Tons, Rock Island, Ill., flood control work, Mississippi River, to Duffin Iron Co., Chicago, through United Construction Co., Winona, Minn., contractor.

185 Tons, Ellsworth County, Kan., bridge, to St. Joseph Structural Steel Co., St. Joseph, Mo.

180 Tons, Detroit, warehouse addition for Bopp Steel Co., to Austin Co., Cleveland.

175 Tons, Cleveland, addition for Warner & Swasey Co., to Patterson-Leitch Co., Cleveland.

135 Tons, Oak Hill, Ohio, State bridge, to an unnamed bidder.

100 Tons, Detroit, factory addition for Detroit Stamping Co., to Austin Co., Cleveland.

WESTERN STATES

2500 Tons, Seattle, Boeing Airplane Co., plant No. 2, to Pacific Car & Foundry Co., Seattle.

1200 Tons, Fairbanks, Alaska, Army hangar, to Columbia Steel Co., San Francisco.

780 Tons, Rock Springs, Wyo., two underpasses and one overhead crossing, to American Bridge Co., Pittsburgh, through Frank M. Kenney, Denver, contractor.

600 Tons, Redcliff, Colo., bridge, to Minneapolis-Moline Power Implement Co., Minneapolis.

600 Tons, Fairbanks, Alaska, warehouse and other structures for Army (Invitation 104), to Milwaukee Bridge Co., Milwaukee.

450 Tons. Estes Park, Colo., tunnel supports for Continental Divide Tunnel, to Colorado Fuel & Iron Corp., Denver, through S. S. Magoffin Co., Englewood, Colo., contractor.

430 Tons, Pearl Harbor, T. H., and Mare Island, Cal., caisson gates for Navy (Specifications 9488), to Consolidated Steel Corp., Los Angeles.

400 Tons, Burbank, Cal., Lockheed Aircraft Co., assembly building No. 9, to Bethlehem Steel Co., Los Angeles.

345 Tons, Vancouver, Wash., conveyor bridge for Aluminum Co. of America, to Bethlehem Steel Co., Bethlehem, Pa.

340 Tons, Los Angeles, Los Angeles River Improvement, section VI, to Columbia Steel Co., San Francisco, through Shannahan Brothers, Huntington Park, Cal., contractors.

115 Tons, Denver, 130 ft. turntable for Denver & Rio Grande Western Railroad, to American Bridge Co., Pittsburgh.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

2800 Tons, S. Jamaica, N. Y., Woodrow Wilson High School.

1100 Tons, West Reading, Pa., power house additions.

550 Tons, New York, grade separation, Westchester Avenue, for Triboro Bridge Authority.

500 Tons, Caldwell, N. J., two-story building for Curtiss-Wright Aircraft Corp.; Albert Kahn, Inc., Detroit, contractor; bids June 10.

450 Tons, Sussex, N. J., railroad crossing elimination, route No. 23, section 8B.

430 Tons, Clearfield County, Pa., highway bridge.

400 Tons, Rochester, N. Y., apartment house for Leo Calihan.

375 Tons, Philadelphia, extension to building No. 18, Navy Yard.

350 Tons, Vienna, Md., power house additions.

330 Tons, Elizabeth, N. J., office building for Grayclan Co.

300 Tons, Bridgeport, Conn., foundry addition for Bullard Co.

300 Tons, East Pittsburgh, Pa., receiving building for Westinghouse Electric & Mfg. Co.

275 Tons, Baltimore, McCullough housing project for Baltimore Housing Authority; Aetna Contracting Co., general contractor.

263 Tons, Tionesta, Pa., State bridge.

260 Tons, Northumberland County, Pa., highway bridge.

250 Tons, Buffalo, Statler Hotels Co., store building.

200 Tons, State College, Pa., high school addition.

175 Tons, Fall River, Mass., building for New England Telephone & Telegraph Co.

140 Tons, Pawtucket, R. I., garage extension for United Electric Railroad.

140 Tons, Trenton, N. J., building for Garden Apartments.

130 Tons, Oneonta, N. Y., building for Sears, Roebuck & Co.; Bethlehem Contracting Co., Bethlehem, Pa., general contractor.

110 Tons. Niagara Falls, N. Y., plant building No. 1 for B. F. Goodrich Co.

THE SOUTH

350 Tons, Gravel Switch, Ky., lock crossing bridge, Kentucky Dam, for TVA.

120 Tons. Elkins, W. Va., repairs to bridge for Western Maryland Railroad.

CENTRAL STATES

275 Tons, Ladysmith, Wis., State bridge; bids June 11.

250 Tons, Detroit, factory addition for American Metal Products Co.

250 Tons, State of Wisconsin, six beam spans; bids June 11.

220 Tons, Burwell, Neb., State bridge; bids June 6.

117 Tons, Dayton, Ohio, McCook Field housing project; W. R. Goss, Chicago, low bidder.

110 Tons, Decatur, Ind., addition to power house; bids June 6.

110 Tons. Detroit, warehouse for Detroit Gasket & Mfg. Co.

WESTERN STATES

3446 Tons, Kettle Falls, Wash., railroad bridge for Great Northern relocation (Bureau of Reclamation Specifications 914); bids July 1.

2200 Tons, Oakland, Cal., four Government storehouses, Specification 9795.

2100 Tons, Alameda, Cal., four land plane hangars, Specification 9185.

460 Tons, Safford, Ariz., Gila River bridge, including H-piling; bids June 7.

330 Tons, Sitka Kodiak, Alaska, 20 buildings, for Navy Department.

147 Tons, Glendale, Cal., Louis Street bridge; bids June 13.

FABRICATED PLATES

AWARDS

2300 Tons, Glendale-Burbank, Cal., pipe line, to Southwest Welding Co.

675 Tons, Stamford, Conn., two tanks for Michael Hoffman Fuel Oil Co., to Chicago Bridge & Iron Co., Chicago.

600 Tons, Ellsworth, Kan., Kanapolis Dam, item 28, to Commercial Shearing & Stamping Co., Youngstown.

510 Tons, Leetsdale, Pa., two oil barges for Lea River Lines, to Nashville Bridge Co., Nashville, Tenn.

500 Tons, Omaha, Neb., gas holder for Metropolitan Utility District, to Stacey Brothers Gas Construction Co., Cincinnati.

250 Tons, Deer Creek, Utah, Deer Creek Dam outlet pipes (Specification 1363-D), to Western Pipe & Steel Co., Los Angeles.

170 Tons, Baltimore, four tanks for U. S. Industrial Chemicals, Inc., to Ingalls Iron Works Co., Birmingham.

Reinforcing Steel

Awards of 9450 tons; 2550 tons in new projects

AWARDS

ATLANTIC STATES

1000 Tons, Washington, National Guard drill hall, to Bethlehem Steel Co., Bethlehem, Pa., through Charles H. Tompkins Co., Washington.

800 Tons, Hamilton, Franklin, Clinton and Warren Counties, N. Y., mesh for State highway projects, to Truscon Steel Co., Youngstown, Ohio, through Louis Mayersohn, Albany, N. Y.

600 Tons, Elizabeth, N. J., housing project, to Bethlehem Steel Co., Bethlehem, Pa.; Walter Kidde, contractor.

500 Tons, Niagara Falls, N. Y., Rainbow Bridge, contracts 1-A, and 1-4, to Bethlehem Steel Co., Bethlehem, Pa., McLain Construction Co., contractor.

390 Tons, Baltimore, pumping stations, U. S. Engineer, to Bethlehem Steel Co., Bethlehem, Pa., through Sordoni Construction Co., contractor.

285 Tons, Somerfield, Pa., Youghiegheny River dam, U. S. Engineer, to Bethlehem Steel Co., Bethlehem, Pa., through Holmes Construction Co., contractor.

150 Tons, Northampton, Mass., pumping station, to Truscon Steel Co., Youngstown.

100 Tons, Birch Hill, Mass., dam to Bethlehem Steel Co., Bethlehem, Pa., B. Perini & Son, Inc., Framingham, Mass., contractor.

100 Tons, Webster Township, N. H., dam, to an unnamed bidder.

100 Tons, Chester, Pa., school, to Bethlehem Steel Co., Bethlehem, Pa.

CENTRAL STATES

290 Tons, Kansas City, Mo., Grand Avenue viaduct, to Sheffield Steel Corp., Kansas City, through J. A. Tobin Construction Co., contractor.

205 Tons, Ames, Iowa, Iowa State Fair building, to Truscon Steel Co., Youngstown.

178 Tons, Milwaukee, Sears-Roebuck building to Joseph T. Ryerson & Son, Inc., Chicago.

175 Tons, Detroit, Brewster housing project, to Truscon Steel Co., Youngstown.

114 **Tons,** Chicago, Northwest station Commonwealth Edison Co., to Bethlehem Steel Co., Bethlehem, Pa.

100 **Tons,** State of Indiana, bars and mesh for State highway project, to Truscon Steel Co., Youngstown, through Roger Daoust.

WESTERN STATES

2000 **Tons,** Sitka and Kodiak, Alaska, Navy air bases, to Bethlehem Steel Co., Seattle, through Siems-Drake-Puget Sound, Seattle, contractor.

855 **Tons,** Newkirk, N. M., Tucumcari project (Invitation 32801-A), to Carnegie-Illinois Steel Corp., Denver.

430 **Tons,** Eugene, Ore., Fern Ridge Dam, to Columbia Steel Co., Portland, Ore.

400 **Tons,** Pasadena, Cal., Broadway Department Store, to Blue Diamond Corp., Los Angeles.

210 **Tons,** San Jose, Cal., library for State College, to San Jose Steel Co., through Carl N. Swenson Co., San Jose, contractor.

150 **Tons,** Tongue Point, Ore., barracks, officers' quarters, and dministration building, to Poole & McGonigle, Portland, Ore., through Western Construction Co., Seattle, contractor.

124 **Tons,** San Francisco, reinforcing bars and tank rods for Treasury Department (Invitation 9157), to Bethlehem Steel Co., San Francisco.

105 **Tons,** Los Angeles, mesh for Metropolitan Water District (Specifications 322), to Trojan Steel Co., Los Angeles.

HAWAII

195 **Tons,** Hickam Field, equipment repair building, to Honolulu Iron Works, Honolulu, T. H., through Walker & Olund, Honolulu, contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

180 **Tons,** Newark, N. J., Passaic River bridge deck, section 30C.

161 **Tons,** Pike County, Pa., Pennsylvania highwy project R-220, section 7; bids June 7.

150 **Tons,** Chicopee, Mass., two pumping stations.

142 **Tons,** New York, contract No. 22, East River bulkhead; bids June 4.

130 **Tons,** Sussex, N. J., grade crossing elimination, route No. 23, section 8B.

CENTRAL STATES

450 **Tons,** Chicago, traffic fins for Chicago Park district; bids in.

340 **Tons,** N. Kansas City, Kan., Procurement Invitation No. 5665; bids taken.

120 **Tons,** Sandusky, Ohio, Neal and Marlboro Streets relief sewers; bids June 12.

100 **Tons,** St. Paul, Minn., Coca Cola building.

WESTERN STATES

145 **Tons,** Riverside, Cal., sewage treatment plant; bids June 25.

110 **Tons,** Safford, Ariz., Gila River bridge; bids June 7.

107 **Tons,** Los Angeles, underpass, Arroyo Seco Parkway between Avenue 26 and San Fernando Road; bids June 12.

100 **Tons,** Newark, Cal., Leslie Salt Co. plant.

CANAL ZONE

292 **Tons,** Panama Canal, schedule No. 4067; bids May 29.

Cast Iron Pipe

Town Council, University Park (Dallas), Tex., plans pipe line extensions and replacements in water system and other waterworks installation, including new steel tower. Cost about $150,000. Election has been called June 15 to vote bonds in that amount.

Albany, Tex., plans pipe line extensions and replacements in water system, and other waterworks installation. Cost about $60,000. Bond issue in that amount has been authorized. Freese & Nichols, Capps Building, Fort Worth, Tex., are consulting engineers.

Creston, Iowa, plans about 4000 ft. of 4-in. pipe and 7000 ft. of 2-in. for water system; also other waterworks equipment. Cost over $30,000.

Highland Park, Ill., closes bids June 10 for 7380 ft. of 16-in. pipe for main water line, with fittings, valves, etc.

Omak, Wash., plans about 15,950 ft. of 6 and 2-in. pipe for extensions and replacements in water system, and other waterworks installation. Cost about $32,700, of which approximately $19,000 will be secured through Federal aid. Work will begin this month.

Hanska, Minn., plans pipe lines for water system and other waterworks installation. Cost about $40,000, of which $20,000 will be secured from Federal aid and similar amount represented by bond issue. Druar & Milinowski, Pioneer Building, St. Paul, Minn., are consulting engineers.

Eugene, Ore., plans pipe line extensions and replacements in water system, and other waterworks installation. Fund of $93,800 has been secured through Federal aid. W. J. Moore is superintendent of water department.

City Council and County Board of Supervisors, San Francisco, plan joint construction of pipe line from reservoir at San Andreas to Richmond, Sunset and Twin Peaks districts for main water supply. Cost close to $225,000. L. T. McAtee, 425 Mason Street, is chief engineer for Public Utilities Commission.

Ableman, Wis., plans pipe lines for water system and other waterworks installation. Cost about $83,000. General Engineering Co., Portage, Wis., is consulting engineer.

Pipe Lines

Ohio River Refining & Terminal Co., 4201 Liston Avenue, Cincinnati, plans two steel pipe lines for oil transmission to new bulk storage and distributing plant to be built on Ohio River, near Anderson Ferry Road; also installation of three large steel tanks and other facilities.

W. T. Shelton Drilling Co., Ada, Okla., plans steel pipe lines for oil transmission in oil field at Dora, Seminole County, Okla., where new wells will be developed; also will install pipe line gathering system and tank farm facilities.

Bureau of Reclamation, Denver, has awarded contract to Western Pipe & Steel Co., Los Angeles, at $78,895 for eight 110-in. and two 91-in. welded steel pipes for outlets at Friant Dam, Central Valley project, Cal. (Specification 903).

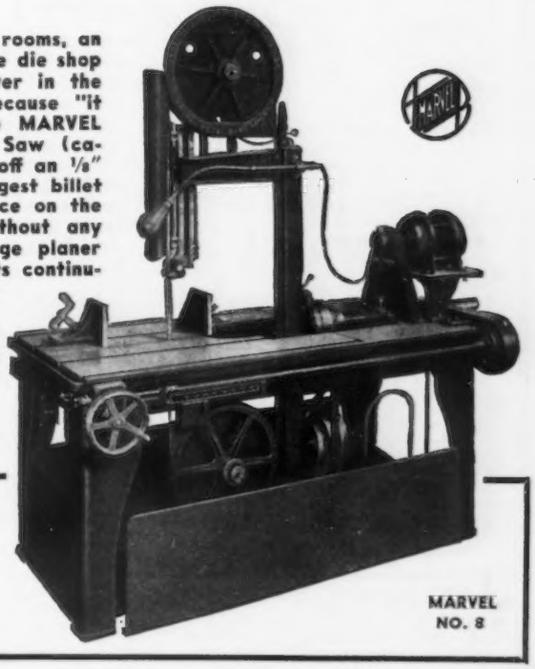
Center, Tex., has let contract to W. M. Redditt Co., 639 Gladstone Boulevard, Shreveport, La., for 8-in. welded steel pipe line from Joaquin gas field to city limits, about 14 miles, for natural gas transmission; also for installation of distributing pipe line system. Cost close to $100,000.

Western Natural Gas Co., Inc., care of Corporation Trust Co., Industrial Trust Building, Wilmington, Del., recently chartered under Delaware laws by George R. Brownell, Westfield, N. J.; Elvis J. Stahr, 444 East Fifty-seventh Street, and Jesse G. Helges, 519 East Eighty-sixth Street, both New York, with nominal capital of $100,000, plans new welded steel pipe line from gas field at Hugoton, Kan., to Milwaukee, about 770 miles, with branch lines to points in Nebraska and Missouri, for natural gas transmission. Cost estimated at $30,000,000 with booster stations, control plants at terminals and other operating facilities. Extensions in main pipe line system are proposed later to Beloit, Madison, Racine, Janesville and other points in Wisconsin. New company will furnish natural gas at wholesale only to large industrial consumers and public utility interests, and will not operate distribution system. Right-of-way is being secured and application has been made for Federal permission to proceed with project. Company will increase initial capital to working fund of $1,000,000, and plans immediate financing through bond issues to total $26,000,000. Paul Kayser, New York, will be president of new organization.

MARVEL Saws

MARVEL No. 8 . . .
It does all things well!

The busiest tool in the tool rooms, an essential tool in the complete die shop and a time and money saver in the maintenance department, because "it does all things well." The MARVEL No. 8 Metal Cutting Band Saw (capacity 18" x 18") will snip off an ⅛" drill rod, rough out the largest billet or cut a perfect 45° mortice on the end of a large I-beam without any special setting up. Its large planer type bed takes all work. Its continuous blade feeds into the work at any angle from 45° right to 45° left. It has a large removable vise and a combination hand and/or power feed.



WRITE FOR BULLETIN 800A

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"The Hack Saw People"
5700 Bloomingdale Ave.
Chicago, U.S.A.

Eastern Sales Office:
199 Lafayette St., New York

MARVEL NO. 8

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢													
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, M'FG Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Soft steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢					2.40¢	2.70¢			
Reinforcing (billet)[7]	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢			2.20 to 2.25¢	2.25 to 2.30¢	1.80 to 2.00¢		
Reinforcing (rail)[7]	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢	1.70 to 1.90¢				2.20 to 2.25¢	2.25 to 2.30¢	1.80 to 2.00¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢										
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢										
Spring	3.20¢	3.20¢		3.20¢	3.20¢										
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢					2.85¢	2.95¢			
IRON BARS															
Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted to distributers. The so-called published price on new billet reinforcing bars is 2.15c. a lb. f.o.b. major basing points, and on rail reinforcing bars is 2.00c. a lb. The price range shown above, however, represents the going price at the present time. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in to 8 in.	$54.00
8 in. to 12 in.	52.00
12 in to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the making of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	$3.05

	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	56
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and 6 in. and smaller	68½
Larger and longer up to 1 in.	66
1⅛ in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	67
9/16 in. to 1 in. inclusive	64
1⅛ in. to 1½ in. inclusive	62
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. through 1½ in.	62	62
1⅝ in. and larger	60	60

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	72½
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	83½

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(1½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws

	Per Cent Off List
Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	May 29	May 31	June 1	June 3	June 4
Copper, Electrolytic[1]	11.50	11.50	11.50	11.50	11.50
Copper, Lake	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	54.00	55.00	....	55.00	55.00
Zinc East St. Louis[2]	5.75	5.75	6.00	6.25	6.25
Lead, St. Louis[3]	4.85	4.85	4.85	4.85	4.85

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

Tin	New York	Cleveland
Straits pig	56.00	56.50
Copper		
Lake	13.25	12.625
Electro	12.75	12.625
Castings	12.375	12.375
H. R. sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow, sheets*	18.31	18.31
Yellow, rods*	13.26	13.26
Seamless tubes*	21.06	21.06
Zinc		
Slabs	7.60	7.75
Sheets, No. 9 casks	12.00	12.00
Lead		
American pig	6.10	5.50
Bar	8.05	8.25
Cut sheets	8.25	8.25
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.50	21.50
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	33.75	32.50
Babbitt		
Anti-friction grade	22.50	22.00

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

Copper	Dealers' Buying Prices	Dealers' Selling Prices
Hvy. crucible	9.00	9.625
Hvy. and wire	8.00	8.375
Light and bottoms	7.125	7.625
Brass		
Heavy	4.875	5.375
Light	4.00	4.75
No. 1 yel. turn	4.50	5.50
No. 1 red or compo. turn	7.375	7.875
Hvy. mach. compo.	7.50	8.375
Lead		
Heavy	4.00	4.375
Aluminum		
Cast	8.50	9.50
Sheet	13.50	14.50
Zinc	3.00	3.75

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 19c.-20c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $197 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 12c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade ..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.55
2500 (5 Ni)	2.25
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.65
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo,1.5-2 Ni)	1.10
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
Cr-Ni-V	1.50
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c., carlots.

PRESSED COLD by PARISH In 4000 ton Press

The method best suited for each particular stamping—to insure most effective results, most efficient production and most modest cost—is employed when you present your problems to the Parish plant.

Equipped to handle all types of work in all methods and sizes of stamping, our plant is able to meet your specifications in all its elements, including the factor of time.

Illustrated is a Spring Plank for railroad freight car trucks. Made of 7/16" metal—16⅝" wide at ends, 14¼" wide at center, and 93¼" long with flanges 3⅜" high at center, 2 3/16" high at ends—it was pressed cold from heavy steel.

The submission of your requirements for review involves you in no obligation.

PARISH
PRESSED STEEL CO.
READING, PENNA.

Pacific Coast Representative
F. Somers Peterson Co.,
57 California St.,
San Francisco, California

PARISH Specialists in STAMPINGS of Distinction

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H't strip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d.13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d.13 B.W.G.	10.67	9.26	....
1½ in. o.d.13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d.13 B.W.G.	13.42	11.64	11.06
2 in. o.d.13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d.13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d.12 B.W.G.	18.45	16.01	15.16
2½ in. o.d.12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d.12 B.W.G.	21.42	18.59	17.54
3 in. o.d.12 B.W.G.	22.48	19.50	18.35
3½ in. o.d.11 B.W.G.	28.37	24.62	23.15
4 in. o.d.10 B.W.G.	35.20	30.54	28.66
4½ in. o.d.10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2.000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price=$200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	36
¼ to ⅜ in.	59	43½
½ in.	63½	54
¾ in.	66½	58
1 to 3 in.	68½	60½

Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+30
½ in.	24	6½
¾ in.	30	13
1 and 1¼ in.	34	19
1½ in.	38	21½
2 in.	37½	21

Lap Weld

Steel		
2 in.	61	52½
2½ and 3 in.	64	55½
3½ to 6 in.	66	57¼
7 and 8 in.	65	55½
9 and 10 in.	64½	55
11 and 12 in.	63½	54
Wrought Iron		
2 in.	30½	15
2½ to 3½ in.	31½	17½
4 in.	33½	21
4½ to 8 in.	32½	20
9 to 12 in.	28½	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	41½
¼ to ⅜ in.	56½	45½
½ in.	61½	53½
¾ in.	65½	57½
1 to 3 in.	67	60
Wrought Iron		
¼ and ⅜ in.	+10	+43
½ in.	25	9
¾ in.	31	15
1 to 2 in.	38	22½

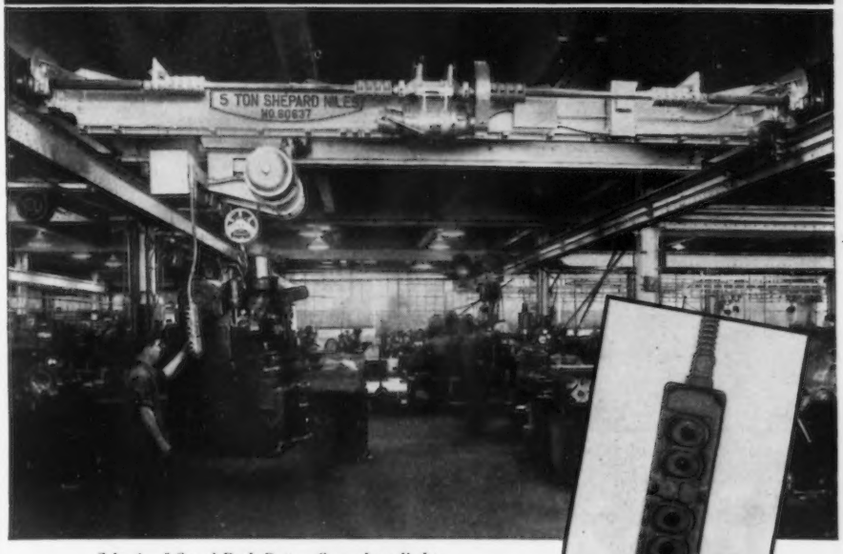
Lap weld, extra strong, plain ends

Steel		
2 in.	59	51½
2½ and 3 in.	63	55½
3½ to 6 in.	66½	59
7 and 8 in.	65½	56
9 and 10 in.	64½	55
11 and 12 in.	63½	54
Wrought Iron		
2 in.	33½	18½
2½ to 4 in.	39½	25½
4½ to 6 in.	37½	24
7 and 8 in.	38½	24½
9 to 12 in.	32	20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

OVERHEAD
Electric Traveling Cranes
CAPACITIES 1 TO 450 TONS



Selective 5-Speed Push Button Control applied to a Shepard Niles Inner-Running Trolley Crane.

Shepard Niles Selective 5-Speed Master Switch.

● Up under the ceiling there is always a clear right of way for moving loads. Floor space is saved—aisles are never blocked—and materials move faster, move most economically on the crane or hoist precisely suited to the job.

Shepard Niles offers Electric Cranes of practically every type for lifting and moving loads up to 450 tons and Electric Hoists of more than 5000 standard types and sizes.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

356 SCHUYLER AVENUE . . . MONTOUR FALLS, N. Y.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, bessemer, 51.50%..	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

	Per Unit
Algerian, low P, Cu free, dry, 55 to 58% Fe.....	14c.
Caucasian, washed, 52% Mn...	50c.
African, Indian, 44 to 48% Mn.	46c.
African, Indian, 49 to 51% Mn.	49c.
Brazilian, 46 to 48% Mn.....	47c.
Cuban, del'd, duty free, 51% Mn	62c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered	$23.00 to $23.50
Tungsten, domestic scheelite, delivered	23.00 to 23.50
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton:	
South African (low grade)..	$19.00
Rhodesian, 45%.....	22.00
Rhodesian, 48%.....	26.00 to 27.00

*All foreign ore prices are nominal. War conditions have prevented trading in Swedish and Turkish ores and all quotations have therefore been withdrawn.

The Right "FOLLOW THROUGH" Counts in Making Quality Steel

Air view of Wisconsin Steel Works by Chicago Aerial Survey Co.

Users of alloy and carbon steels recognize the value of dealing with a firm that "follows through."

Wisconsin Steel maintains a rigid "follow through" policy. It begins when the salesman writes the order. It continues through every operation at Wisconsin Steel's modern, up-to-date plant. A competent staff sees that the finished product measures up to the most exacting specifications.

Wisconsin Alloy and Carbon Steels are being used successfully by manufacturers in many lines of business. Ask us to point out how your business can benefit from Wisconsin Steel's "follow through" policy. We are well equipped to supply a full range of alloy and carbon steels, as well as high quality pig iron that is "better controlled from mine to mold." Write or phone us. Inquiries will receive prompt attention.

WISCONSIN STEEL COMPANY

General Offices:
180 North Michigan Avenue Chicago, Illinois
Affiliate of International Harvester Company

WISCONSIN STEEL

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.....	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)...	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR

	Per Net Ton
Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail.....	$20.00
Domestic, f.o.b. Ohio River landing barges	20.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines..	$20.50 to 22.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid....	$25.00 to $25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....	$31.00
As above, in bags, f.o.b. same mines	$32.60

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works
Super-duty brick, at St. Louis..	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey.....	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois.....	42.75
Second quality, New Jersey....	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton.....	7.10

Silica Brick

Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick

	Net per Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester...	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester	$72.00
Chemically bonded, f.o.b. Baltimore	61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....$100.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$32.00
Domestic, 26 to 28%..... 39.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk).....$69.50*
50% (ton lots, packed)..... 82.00*
75% (carload lots, bulk).....126.00*
75% (ton lots, packed) 142.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....$33.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....$27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon.....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $98.00*
2.50% carbon 103.00*
2% carbon 108.00*
1% carbon 118.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V., del'd $2.70 to $2.90†
Ferracolumbium, per lb. contained columbium, f. o. b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton.....$142.50

•Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton.....$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton $58.50
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville $75.00

Ferromolybdenum, per lb. Mo, f.o.b. furnace..... 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

FUEL OIL

Per Gal.

No. 3, f.o.b. Bayonne, N. J.....4.75c.
No. 6, f.o.b. Bayonne, N. J.....3.21c.
No. 5 Bur. Stds., del'd Chicago..3.25c.
No. 6 Bur. Stds., del'd Chicago..2.75c.
No. 3 distillate, del'd Cleveland.5.25c.
No. 4 industrial, del'd Cleveland.5.00c.
No. 5 industrial, del'd Cleveland.3.75c.
No. 6 industrial, del'd Cleveland.3.25c.

A COLD CASH SAVING ON EVERY HEAT
with
SUN HEAVY DUTY LUBRICANTS
Heat after heat has shown a tremendous saving in a leading steel plant's rolling mill since they changed to SUN Heavy Duty LUBRICANTS.
And savings in lubricant costs were not all! Operating power was slashed by 25% . . . cost of bearing maintenance reduced to practically nothing . . . and a real worthwhile saving was effected in labor.
Another case of what SUN Lubricants have accomplished for "men of steel". Another example that shows how SUN "H.D." LUBRICANTS can make possible a "cold cash saving on every heat". Let us tell you more about saving with Sun . . . write . . .
SUN OIL COMPANY, PHILADELPHIA
PETROLEUM PRODUCTS FOR ALL INDUSTRIES
SUN OILS
Photo Courtesy John P. Mudd

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt .....$4.00 to $4.25
Foundry, f.o.b. Connellsville, prompt .....$5.25 to 5.50
F'dry, by-product, Chicago.... 10.50
F'dry, by-product, New England 12.50
Foundry, by-product, Newark or Jersey City .....$11.30 to $11.90
F'dry, by-product, Philadelphia 11.13
F'dry, by-product, Cleveland... 11.05
F'dry, by-product, Cincinnati.. 10.50
Foundry, Birmingham 7.50
F'dry, by-product, St. Louis $10.75 to $11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports.....$14.75

BRITISH AND CONTINENTAL

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export. £17 18s.
Tin plate, per base box 32s. to 33s.
Steel bars, open hearth 13£ 9s.
Beams, open hearth.... 12£ 2s. 6d.
Channels, open hearth.. 12£ 2s. 6d.
Angles, open hearth.... 12£ 2s. 6d.
Black sheets, No. 24 gage 17£ max.*; 17£ min.**
Galvanized sheets, No. 24 gage 19£ 10s. max.*; 19£ 10s. min.**

*Empire markets only.
**Other than Empire markets.

Continental

Per Gross Ton, Belgian Francs, f.o.b. Continental Ports

Bars, merchant 1500
Plates 1750
Joists 1475
Sheets, thin 1900

Above prices are minimum base to which 100 francs should be added to cover war risk insurance, freight charges, etc.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$24.50***	***$24.00***	***$25.50***	***$25.00***	.....
Brooklyn	***26.50***	.....	.....	***27.00***	.....
Jersey City	***25.53***	***25.03***	***26.53***	***26.03***	.....
Philadelphia	***24.84***	***24.34***	***25.84***	***25.34***	.....
Bethlehem, Pa.	$24.00	$23.50	$25.00	$24.50	.....
Everett, Mass.	24.00	23.50	25.00	24.50	.....
Swedeland, Pa.	24.00	23.50	25.00	24.50	.....
Steelton, Pa.	.....	23.50	.....	.....	28.50
Birdsboro, Pa.	24.00	23.50	25.00	24.50	28.50
Sparrows Point, Md.	24.00	23.50	.....	.....	.....
Erie, Pa.	23.00	22.50	24.00	23.50	.....
Neville Island, Pa.	23.00	22.50	23.50	23.00	.....
Sharpsville, Pa.	23.00	22.50	23.50	23.00	.....
Buffalo	23.00	22.00	24.00	23.50	28.50
Cincinnati	***23.44***	***23.61***	.....	***24.11***	.....
Canton, Ohio	***24.39***	***23.89***	***24.89***	***24.39***	.....
Mansfield, Ohio	***24.94***	***24.44***	***25.44***	***24.94***	.....
St. Louis	***23.50***	***23.02***	.....	.....	.....
Chicago	23.00	22.50	23.50	23.00	.....
Granite City, Ill.	23.00	22.50	23.50	23.00	.....
Cleveland	23.00	22.50	23.50	23.00	.....
Hamilton, Ohio	23.00	22.50	.....	23.00	.....
Toledo	23.00	22.50	23.50	23.00	.....
Youngstown	23.00	22.50	23.50	23.00	.....
Detroit	23.00	22.50	23.50	23.00	.....
St. Paul	***25.63***	.....	***26.13***	***25.63***	.....
Duluth	23.50	.....	24.00	23.50	.....
Birmingham	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle	***26.50***	.....	.....	.....	.....
Provo, Utah	21.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce.....$22.50

CHARCOAL

Lake Superior fce.....$27.00
Delivered Chicago 30.34

*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.15	$3.05	$3.15	$3.35	$3.38	$3.23	$3.05	$3.51	$3.45	$3.18	$3.30	$3.48	$4.10
Sheets, cold rolled	....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	....	4.12	4.35	4.43	6.30
Sheets, galvanized	4.75	4.60	4.42	4.50	4.30	4.64	4.45	4.66	4.75	4.95	5.00	4.98	5.25
Strip, hot rolled	3.40	3.40	3.30	3.75	3.76	3.48*	3.62	3.86	3.70	3.52	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.31	3.20	3.22	3.26	....	3.41	3.63	3.54	....
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.47	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.47	3.80	3.68	4.00
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.62	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.50	....	7.47	7.45	7.33	9.40
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.15	8.56	8.59	8.45	8.15	8.63	....	8.52	8.84	8.38	10.65
Bars, cd. drn. SAE 3100	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.23.

THE unaided eye sees little difference between high and low quality, between careful and careless manufacture, in files. But microscopic examination reveals plenty! And performance still more!

Through a magnifying glass, note the uniformity of every cut, the sharpness of every tooth in a Nicholson or Black Diamond File. Note the evenness with which the file blank has been prepared. Tap the file for the ring that spells soundness and proper hardening for a long serviceable life.

Then put it to the test of performance — on the kind of work for which it is intended. Check it for keenness and smoothness of bite throughout its length (no "skips," "hills" or "valleys"), for the way it holds to the line of work, for the number of sharp-cutting file strokes it can deliver under proper handling.

Sum up everything, and see how reasonably you may expect the cost of these *top-quality* files to be more than absorbed in greater and faster production.

NICHOLSON FILE CO., Providence, R. I., U. S. A.
Canadian Plant, Port Hope, Ont.

NICHOLSON FILES

FOR EVERY PURPOSE

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic

● **Continental Can Co.,** 100 East Forty-second Street, New York, has let general contract to Austin Co., Cleveland, for one-story addition to branch plant at Tampa, Fla. Cost over $80,000 with equipment.

Fleischmann Distilling Corp., 595 Madison Avenue, New York, subsidiary of Standard Brands, Inc., plans expansion and improvements in distillery at Peekskill, N. Y., including one-story addition for increased output of blended whiskey. Cost over $125,000 with equipment. Company has acquired distilling plant and other assets of Daviess County Distilling Co., Owensboro, Ky., and will operate as a branch distillery in conjunction with Peekskill plant. Expansion in output is planned.

Quartermaster Supply Officer, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until June 13 for one electric muffle furnace, one super-centrifuge and one dead-weight pressure gage tester (Circular 626-399).

Dominion Metal & Refining Co. of New Jersey, Inc., 599 Eleventh Avenue, New York, has leased two one-story buildings at former works of Submarine Boat Corp., Port Newark, N. J., for new smelting plant for production of lead, tin alloy, etc. Company was organized recently.

Celanese Corp. of America, Inc., 180 Madison Avenue, New York, cellulose rayon products, has let contract to Virginia Engineering Co., Inc., Newport News, Va., to design and build two one-story additions to branch mill at Celco, near Pearisburg, Va., for expansion in manufacturing division, practically doubling present floor space; also for new boiler plant and other structures. Cost over $400,000 with machinery. Company is arranging increase in authorized funded debt from $20,000,000 to $50,000,000, majority of fund, $30,000,000, for expansion and improvements in mills.

Bayer Co., 170 Varick Street, New York, drugs and chemicals, has let general contract to William G. Sheehan Construction Co., 28-30 DeWitt Street, Albany, N. Y., for three-story and basement addition to plant at Rensselaer, N. Y., 75 x 165 ft. Cost over $85,000 with equipment.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until June 13 for two gas-fired soaking furnaces, tank type (Circular 697).

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until June 10 for 225 mast bases, 700 mast sections, fasteners, fittings, blocks, etc. (Circular 498); until June 11, wind transmitters, wind recorders and weather panels (Circular 508).

C. N. Burman Co., Inc., 10 West Twentieth Street, New York, manufacturer of lamps, lighting fixtures, etc., has purchased former mill of Johnson-Cowdin Co., Paterson, N. J., consisting of three buildings, 150,000 sq. ft. of floor space on six-acre tract, and will modernize for new plant.

Stoll Metal Corp., 12 Dongahan Place, New York, metal products, has leased one-story building at 35 Dupont Street, Brooklyn, for plant, expanding present capacity.

Hudson Iron & Metal Co., East Thirty-third Street, Bayonne, N. J., plans one-story addition, 50 x 200 ft., for a machine shop. Cost close to $45,000 with equipment.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until June 13 for reworking 75,488 lb. of brass turnings (Circular 1527).

Reading Co., Twelfth and Market Streets, Philadelphia, asks bids until June 11 for steel locomotive tires (Contract 1-1940).

Public Works Officer, Building No. 1, Navy Yard, Philadelphia, asks bids until June 19 for one-story addition to machine shop, building No. 18 (Specifications 9405).

Commanding Officer, Ordnance Department, Frankford Arsenal, Bridesburg, Philadelphia, asks bids until June 10 for gages for 105-mm. shells (Circular 2050).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 11 for pneumatic drills and hammers, and rivet sets (Schedule 1834), for Philadelphia Navy Yard.

Buffalo District

● **Spencer Kellogg & Sons, Inc.,** Niagara Square, Buffalo, linseed oil products, has let general contract to Siegfried Construction Co., 6 North Pearl Street, for two-story addition. Cost close to $50,000 with equipment. Green & James, 1 Niagara Square, are architects.

Rochester Gas & Electric Corp., Rochester, N. Y., has authorized fund of about $800,000 for expansion and improvements in properties, including addition to steam-electric generating station, with installation of new turbine-generator unit and auxiliary equipment.

New England

● **American Brass Co.,** Waterbury, Conn., has approved plans for one-story addition, 90 x 195 ft., to South plant, Freight Street, for expansion in brass tube rolling department; also for one-story addition, 60 x 80 ft., to North plant. Cost over $85,000 with equipment.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until June 10 for two circular cutter grinders, spiral generator type (Circular 401), for rebuilding special drilling and reaming machine, and rebuilding tapping unit now on drilling and reaming machines (Circular 398); until June 13, motor-driven, precision boring machine (Circular 408), machinery for producing hand guard (Circular 399).

Montaup Electric Co., Fall River, Mass., has authorized plans for addition to steam-electric generating plant at Somerset, Mass., including new turbine-generator unit, high-pressure boilers and auxiliary equipment. Cost about $3,000,000 with equipment. Stone & Webster Engineering Corp., 49 Federal Street, Boston, will design and supervise erection.

New Britain Machine Co., New Britain, Screw machinery, parts, etc., plans one-story addition. Cost over $60,000 with equipment.

Bridgeport Metal Goods Mfg. Co., Cherry Street, Bridgeport, Conn., is erecting plant to cost $40,000 without equipment. Gellatly Construction Co., Bridgeport, is contractor.

Washington District

● **Chemical Warfare Service,** Edgewood Arsenal, Edgewood, Md., aks bids until June 11 for 1010 pressure cylinders, with valve and wire valve handles (Circular 728).

Contracting Officer, Office of Chief of Engineers, Munitions Building, Washington, aks bids until June 13 for drill press, combination saw jointer, wood and metal-turning lathe, wood-cutting bandsaw, all motor-driven, and one bench grinder (Circular 192) for Fort Belvoir, Va.

Striethmann Biscuit Co., Twelfth Street and Central Parkway, Cincinnati, has let general contract to E. L. Bass & Brothers, 708 Bainbridge Street, Richmond, Va., for new one-story branch baking plant at Richmond. Cost over $75,000 with traveling ovens, conveyors and other equipment. Edward F. Sinnott, 112 East Cary Street, Richmond, is architect.

General Purchasing Officer, Panama Canal, Washington, asks bids until June 10 for 23,000 ft. of plow steel wire rope, 25,000 ft. of wire rope, 2000 ft. of cast steel wire rope (Schedule 4087); until June 11, one 20-ton steam engine locomotive crane, with 46-ft. boom (Schedule 4089); galvanized malleable iron pipe clamps, cable pulling grips, cartridge-type resistors, wire solder, etc. (Schedule 4077); until June 13, steel and brass machine bolts, steel carriage bolts, steel nuts, expansion bolts, corrosion-resisting steel rivets, tinners' rivets, plate washers, brass toggle bolts, etc. (Schedule 4078).

Engineer Board, Fort Belvoir, Va., asks bids until June 10 for one power-driven, movable head, floor-type nibbling machine, with accessories (Circular 53).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 11 for two motor-driven precision bench lathes (Schedule 1764) for Bellevue, D. C.; five motor-driven, double-tilting arbor saws (Schedule 1828) for Carderock, Md., and Philadelphia; 2570 electric storage batteries (Schedule 1856) for Philadelphia; 50 portable electric nibblers (Schedule 1835), dies, taps, diestocks, threading sets and tap wrenches (Schedule 1703), motor-driven honing and lapping machine (Schedule 1778), hydraulic drive mechanisms for generators (Schedule 1713); until June 14, 20 motor-generator sets (Schedule 1801) for Eastern and Western yards.

South Atlantic

● **Charleston Coca-Cola Bottling Co.,** Calhoun and Meeting Streets, Charleston, S. C., has let general contract to M. L. Stephenson, 273 East Bay Street, for new two-story and basement mechanical-bottling, storage and distributing plant, 90 x 100 ft. Cost over $50,000 with equipment.

Merrill-Stevens Dry Dock Co., 1270 N. W. Eleventh Street, Miami, Fla., will begin superstructure for one-story equipment storage and distributing building, 195 x 220 ft., at plant at N. W. Seventeenth Street and waterfront, for which general contract recently was let to M. R. Harrison Construction Corp., Miami. Three new slips at yacht basin also will be built. Cost over $65,000 with equipment. R. A. Belsham, 2145 S. W. Eleventh Street, is engineer.

Western Pa. District

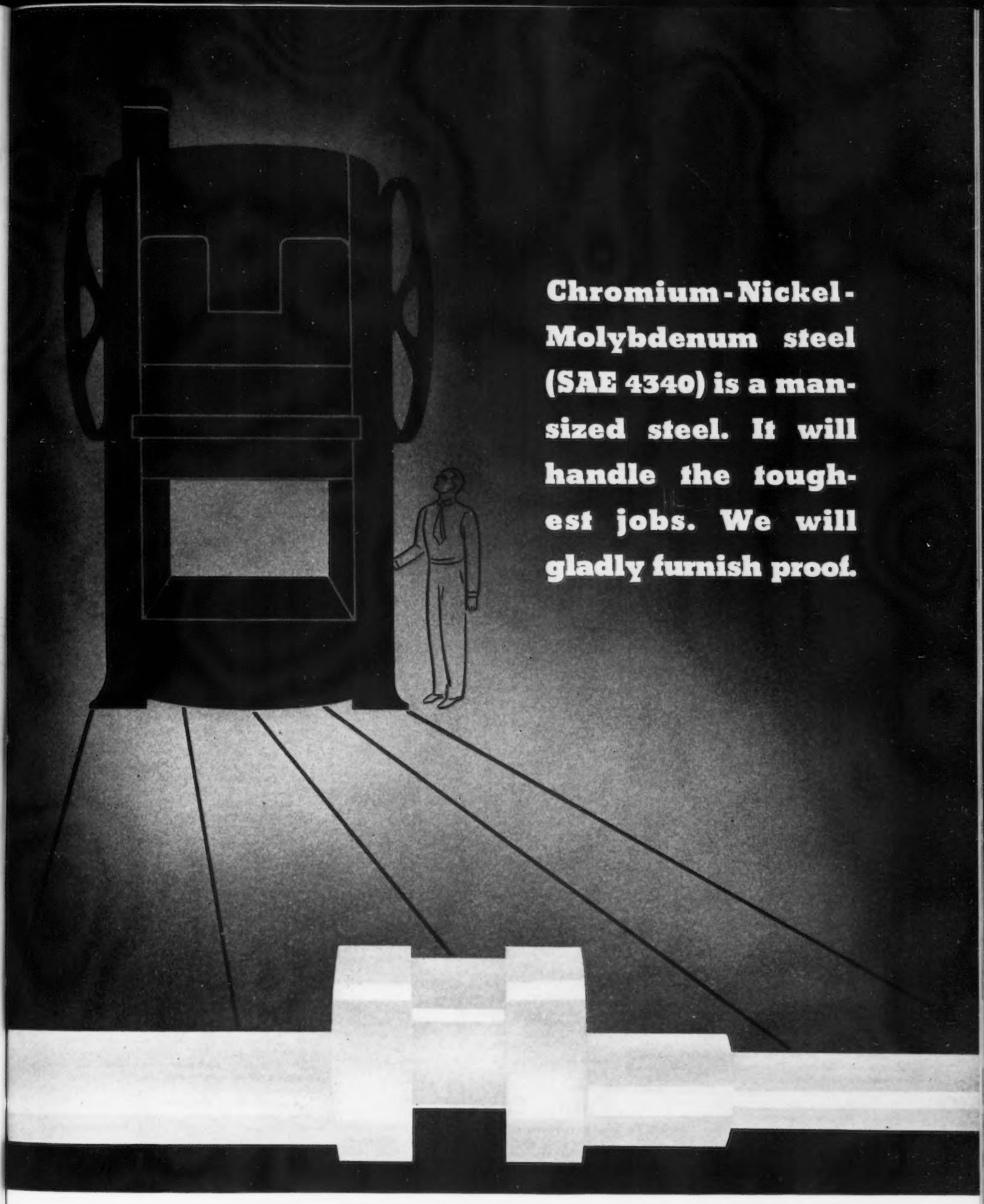
● **Westinghouse Electric & Mfg. Co.,** East Pittsburgh, has approved plans for one-story factory branch, service and distributing plant, 80 x 150 ft., at 540 Grant Street, Bridgeport, Conn. Cost about $50,000 with equipment. Company also has asked bids on general contract for one-story addition, 50 x 240 ft., to branch plant at Sharon, Pa. Cost close to $60,000 with equipment.

Aluminum Co. of America, Inc., Gulf Building, Pittsburgh, has let general contract to A. E. Kemmer, Third and Brown Streets, Lafayette, Ind., for two one-story additions to branch plant at Lafayette, for a tube mill and extrusion mill respectively. Cost over $100,000 with equipment.

Ohio and Indiana

● **Artistic Iron Products, Inc.,** 7310 Bessemer Avenue, Cleveland, ornamental iron products, plans two-story addition. Cost close to $40,000 with equipment.

Westinghouse Electric & Mfg. Co., East Pittsburgh, will take bids this month for two additions to electric refrigerator-manufacturing plant at Mansfield, Ohio, one-story structure, 70 x 360 ft., for expansion in metal-stamping division, and two-story extension to building D, 80 x 80 ft. Cost close to $500,000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with equipment. Albert Kahn, Inc., Detroit, is architect.

Willard Storage Battery Co., East 131st Street and St. Clair Avenue, Cleveland, electric batteries, has let general contract to Austin Co., for two additions to branch plant at Dallas, Tex., one-story, 65 x 120 ft., and two stories, 30 x 60 ft. Cost about $80,000 with equipment.

Monarch Machine Tool Co., Sidney, Ohio, has let general contract to Murray Ferguson, Sidney, for one-story addition, 100 x 180 ft., in part for general production, with remainder for storage and distribution. Cost close to $85,000 with equipment.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until June 10 for one universal ram-type lathe, six precision bench lathes, 24 geared-head engine lathes, two turret lathes, one automatic screw machine and equipment, all motor-driven (Circular 1647), 1200 steel wire casting brushes, 2100 wire scratch brushes (Circular 1661), fire pick head axes, pipe cutters, tinners' seamers, etc. (Circular 1658), 30 to 90 portable field lighting sets (Circular 1673), airspeed tube assemblies (Circular 1690), gasoline strainer self-closing nozzles and gasoline servicing nozzle strainers (Circular 1659).

Board of Public Works, Kendallville, Ind., will take bids soon for two new boilers and other equipment for extensions and improvements in municipal power plant. Cost about $50,000. R. W. Noland, Medical Arts Building, Fort Wayne, Ind., is consulting engineer.

Michigan District

● **Olds Motor Works,** Lansing, Mich., has acquired former local plant of Ryan-Bohn Foundry Co. on 50-acre tract, and will remodel for expansion. A main unit will be used for new heavy steel-stamping division. Cost over $100,000 with machinery.

Bopp Steel Co., Dearborn, Mich., will begin work soon on one-story addition, about 28,000 sq. ft. of floor space, for increase in cold rolled strip steel department; also for extensions in pickling and annealing divisions. Cost close to $100,000 with equipment. Austin Co., Cleveland, is designer and contractor.

Ford Motor Co., Dearborn, Mich., has let contract to Mosher Steel Co., Dallas, Tex., for one-story addition to branch assembling plant at 5200 East Grand Street, Dallas. Cost about $350,000 with machinery.

Southwest

● **Barnsdall Oil Co.,** Petroleum Building, Tulsa, Okla., has approved plans for extensions and improvements in oil refinery at Wichita, Kan., with new crude oil distillation unit, boilers, pumps and other equipment. Cost close to $85,000 with machinery.

American Stove Co., 2001 South Kingshighway Boulevard, St. Louis, stoves, ranges and parts, plans one-story addition and adjoining smaller structures. Cost close to $250,000 with equipment.

Board of Directors, Warrensburg State Teachers' College, Warrensburg, Mo., plans two-story and basement industrial arts building. Cost about $100,000 with equipment. Walter Boschen, 517 St. Francis Street, St. Joseph, Mo., is architect.

United States Engineer Office, Davidson Building, Kansas City, Mo., asks bids until June 10 for carbon steel castings (Circular 223).

Monsanto Chemical Co., 1700 South Second Street, St. Louis, industrial chemicals, etc., plans expansion in plant at Monsanto, Tenn., including additional electric furnaces and auxiliary equipment.

Well Equipment Mfg. Corp., 2023 Semmes Street, Houston, Tex., oil well equipment, has let general contract to A. T. Hingle, 2318 Isabella Street, for one-story addition. Cost about $45,000 with equipment.

City Council, Rusk, Tex., plans new municipal electric power plant and distribution system. Cost about $195,000. Bond issue is being arranged in that amount.

Texas Natural Gas Co., Borger, Tex., plans new natural gasoline plant, with compressor station, steel tank storage and other facilities. Cost close to $100,000 with equipment.

South Central

● **Malbis Baking Co.,** 871 South Broad Street, Mobile, Ala., plans one-story addition to plant, 170 x 270 ft., with adjoining one-tory building, 103 x 200 ft., for service, repair and garage for company motor trucks and cars. Cost about $200,000, of which about $100,000 will be expended for heavy-type traveling ovens, conveyors, loaders, mixers and other equipment.

Constructing Quartermaster, Southeast Air Depot, Mobile, Ala., asks bids until June 11 for one 12,000-gal. gasoline storage tank, and motor-driven gasoline dispensing pump (Circular 6910-18).

Southern Cotton Oil Co., Canal Bank Building, New Orleans, plans one-story addition to plant at Sheffield, Ala. Cost close to $40,000 with equipment. It will replace an existing building.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until June 10 for two mechanical rake classifiers for department of chemical engineering.

Middle West

● **Automatic Engineering Works, Inc.,** 3544 West Gladys Avenue, Chicago, screw machine products, has asked bids on general contract for new one-story and basement plant, 50 x 180 ft., at Adams and Laflin Streets. Cost over $75,000 with equipment. Sidney C. Finch, 134 North La Salle Street, is architect.

Constructing Quartermaster, Chanute Field, Rantoul, Ill., asks bids until June 11 for 100,000 ft. of barbed wire fencing, 17,300 ft. of 6-ft. chain link fence framework, and 9350 ft. of galvanized woven wire fencing (Circular 6627-115).

Coca-Cola Co., 2035 University Avenue, S. E., Minneapolis, has asked bids on general contract for new two-story mechanical-bottling, storage and distributing plant, 110 x 132 ft. Cost about $150,000 with equipment. Ernest H. Schmidt & Co., Coughlan Building, Mankato, Minn., are architects.

Birtman Electric Co., 4140 West Fullerton Street, Chicago, household electrical appliances and parts, has let general contract to Austin Co., Cleveland, for one-story additions to plant at Rock Island, Ill. Cost about $100,000 with equipment.

F. Meyer & Brothers Co., Peoria, Ill., manufacturer of hot air registers, ventilators, etc., plans rebuilding part of plant recently destroyed by fire. Loss close to $200,000 with equipment.

Tousey Varnish Co., 520 West Twenty-fifth Street, Chicago, paints, varnishes, oils, etc., has let general contract to Stressenrueter Brothers, 3020 South Halsted Street, for two-story addition, 125 x 140 ft. Cost close to $60,000 with equipment. Edward H. Nordlie Co., 4825 North California Avenue, is architect.

Pacific Coast

● **Adel Precision Products Co.,** Burbank, Cal., mechanical specialties, plans new two-story plant at 231 South Olive Avenue. Cost close to $45,000 with equipment. McBride, J. H. Hoose & Hoose, 4520 Lankershim Boulevard, North Hollywood, Cal., are architects.

United States Hardware & Paper Co., 3001 East Pico Boulevard, Los Angeles, has acquired tract at Soto and Twenty-sixth Streets, Vernon district, for new one-story plant, about 90,000 sq. ft. of floor space, part of unit to be used for paper-processing division. Cost over $100,000 with equipment.

District Quartermaster, CCC, Medford, Ore., asks bids until June 11 for globe valves, unions, gate valves, galvanized cast iron pipe plugs, reducing couplings, galvanized straight couplings and other equipment (Circular 5908-98).

Timm Aircraft Corp., 1020 Air Way Boulevard, Glendale, Cal., airplanes and parts, is arranging stock issue to total about $200,000, considerable part of proceeds to be used for expansion, equipment and development of new training plane.

Eckert Brewing Co., 666 Gibbons Street, Los Angeles, has let general contract to Frank A. Woodyard, 852 South Robertson Boulevard, for one-story addition, 85 x 145 ft., for storage and distribution. Cost about $40,000 with equipment. Douglas McLellan, Architects' Building, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 11 for one motor-driven shear and copper punch (Schedule 1784); until June 14, motor-driven metal-working lathe (Schedule 1836) for San Diego Naval Air Station; 12 200-amp. welding outlet panels (Schedule 1798), power bumping hammer (Schedule 1791) for Mare Island Navy Yard; three motor-generator sets (Schedule 1786), 13 motor-driven hoists (Schedule 1795), six motor-driven, bench-type jeweler's lathes (Schedule 1804) for Alameda Naval Air Station.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until June 19 for four steel hangars at Naval Air Station, Alameda, Cal. (Specifications 9185).

Canada

● **Singer Mfg. Co., Ltd.,** 700 Ste. Catherine Street West, Montreal, sewing machines and parts, plans one-story and basement unit, 80 x 250 ft. Cost close to $80,000 with equipment.

Gates Petroleum, Ltd., Lindsay Building, Winnipeg, Man., plans new oil refinery, with steel storage tank department and other facilities. Cost about $100,000 with equipment.

RCA-Victor Co., Ltd., 976 Locasse Street, Montreal, talking machines, radio equipment, parts, etc., has let general contract to J. L. E. Price & Co., Ltd., 680 Sherbrooke Street West, for one-story factory branch, storage and distributing plant. Cost close to $60,000 with equipment. W. K. Lyman, 2508 Victoria Street, is architect.

Lincoln Electric Co. of Canada, Ltd., 65 Bellwoods Avenue, Toronto, has awarded general contract to W. B. Sullivan, 30 Bloor Street West, for one-story plant, 100 x 300 ft., at Leaside, Ont. Gordon L. Wallace, 36 Evelyn Crescent, Toronto, is engineer.

McWaters Gold Mines, Ltd., W. J. Hosking, manager, has plans for addition to mill at Rouyn, Que., to cost $70,000.

Canadian Car & Foundry Co., Ltd., 621 Craig Street West, Montreal, will build addition to plant at 1396 St. Patrick Street, to cost $50,000 with equipment.

Imperial Oil, Ltd., Battery Point, Sydney, N. S., will build new oil refinery at cost of $50,000.

Canadian Celanese, Ltd., Drummondville, Que., is erecting $100,000 plant addition, and plans are underway for a second addition to cost like amount. R. H. Sperling is manager.

Ketchum Mfg. Co., Ltd., Westboro, Ont., will build plant addition to cost about $75,000. Henri J. Morin, 95 Sparks Street, Ottawa, is architect.

Department of Munitions and Supply, Ottawa, Ont., G. K. Sheils, Deputy Minister, has called tenders for addition to Dominion arsenal at Valcartier, Que.

Aluminum Co. of Canada, Ltd., 1010 Ste. Catharine Street West, Montreal, has awarded structural steel contract to Dominion Bridge Co., Ltd., Lachine, and Canadian Bridge Co., Ltd., Montreal, in connection with $3,800,000 plant at Arvida, Que. Foundation Co. of Canada, Ltd., 1538 Sherbrooke Street West, Montreal, is general contractor.

Steel Co. of Canada, Ltd., Hamilton, Ont., has awarded structural steel contract to Dominion Bridge Co., Ltd., Lachine, for tin plate mill to cost $500,000. Tope Construction Co., Ltd., 677 Main Street West, Hamilton, is general contractor.